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SIR BENJAMIN BRODIE'S WORKS.

VOL. I.

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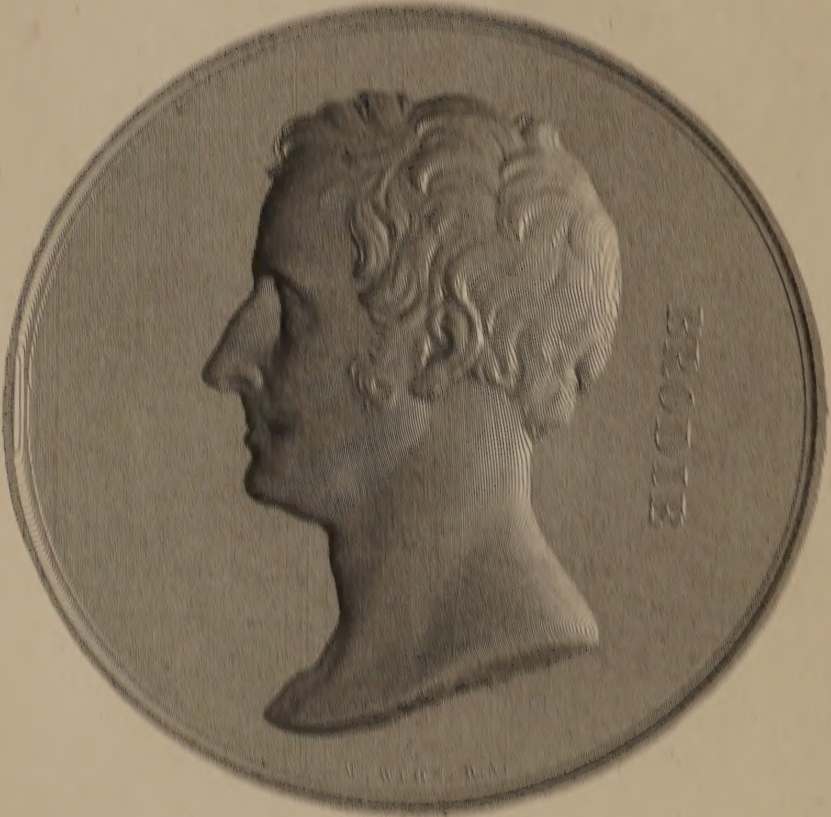

Yrs ever truly
B C Brodie

MEDAL PRESENTED TO SIR BENJAMIN BRODIE ON HIS RESIGNATION
OF THE OFFICE OF SURGEON TO ST GEORGE'S HOSPITAL.

(Frontispiece for Vol. I.)

54635

THE WORKS
OF
SIR BENJAMIN COLLINS BRODIE
BART. D.C.L.
SERJEANT-SURGEON TO THE QUEEN,
PRESIDENT OF THE ROYAL SOCIETY, ETC.

WITH AN AUTOBIOGRAPHY.

COLLECTED AND ARRANGED BY
CHARLES HAWKINS
FELLOW OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.

IN THREE VOLUMES.
VOL. I.

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1865.

BRODIE, Sir Benjamin Collins [1783-1862]

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IN MEMORIAM.

I WISH it to be understood that, in preparing this edition of Sir BENJAMIN BRODIE'S Works, I have not pretended to place myself in the position usually occupied by an 'editor.' Apart from my inability for undertaking such a duty, his works do not require 'editing'—that is, his language needs no explanations or elucidation. He was himself constantly employed in correcting and revising his own productions, and he has left each of them fully on a level with the present state of medical science. In the very last year of his life he occupied himself by having his early notes of cases read over to him (for, unhappily, the state of his sight did not permit him to read), and he dictated many valuable observations, which have been incorporated in this edition of his works. The few notes, which have been appended, are mostly in reference to other writers.

I have not presumed to write 'a Life.' A friendship which extended over more than twenty years, during which

I was the recipient of an ever continuing stream of affectionate kindnesses, stopped only by his death, would alone render me unfit to make a judicial estimate of his character.

But as this edition of his works ought not to go forth without some notice of his life, and of the influence it had on his fellow-men, I have taken the opportunity to put on record what was thought of him by others. His life is indeed written in his works; but the interesting autobiography which has been placed at my disposal will give a further insight into his character.

Those who read his works attentively will see how he educated himself for the duties he was about to undertake, how he acquired the information necessary to make him, what he lived to become—one of the most perfect masters of his art, in this or in any other country, not only as a man of science, a surgeon of the greatest sagacity and of never-failing resources, and a most impressive teacher (for it was impossible for the dullest to listen to his lessons without receiving instruction), but a most accomplished gentleman.

The autobiography closes about the time he resigned the office of surgeon to St. George's Hospital, when the medal (the engraving of which forms the frontispiece to this volume) was presented to him by his pupils and medical friends as a testimony of their gratitude for the mode in which he had performed all the duties connected with that institution. In resigning this office he was actuated, as he ever was, by a sense of duty: how much he felt in severing a connection in which he so much delighted, is best told in his own words.

Having at this period securely placed himself in the highest position as a surgeon, he continued to receive an accumulation of honours and responsibilities, the last of which was the Presidentship of the Royal Society, which he prized more highly than any that could have been offered to him. At this time also he was elected the first President of the General Medical Council, having previously been President of the Royal College of Surgeons, and the Royal Medical and Chirurgical Society, and various other societies. When it was supposed that the University of London might be represented in Parliament, the graduates were not long in fixing upon him as a proper person for such a post: his answer to their request I am able to give through the kindness of Dr. Sibson.

'Savile Row, March 26, 1860.

'My dear Sir,

'I am very much obliged to yourself and your friends, for such an expression of your opinion, and I feel very much flattered by it. I cannot, however, take advantage of the proposal which you have made. It is too late in life for me to enter on a parliamentary career, for which, indeed, I am in no degree fitted by my previous habits. Besides that, the public duties which I have already undertaken, afford me a great deal of occupation, and I could not with any degree of justice, either to myself or to others, venture to make any addition to them.

'I am, my dear Sir,
'Yours very truly,
'B. C. Brodie.

'To Dr. Sibson, F.R.S.'

With regard to his relations with the Royal Society, I cannot do better than quote the following from a letter from Dr. Sharpey, one of the secretaries :—

'Sir Benjamin Brodie was elected a Fellow, February 15, 1810, President, November 30, 1858; and retired from the Presidency, November 1861.

'He had proposed to retire the year before, but remained in office at the earnest request of the Council, and because he then had still a hope of recovering his eyesight sufficiently to enable him to discharge his duties. At the anniversary of 1861, on his retirement, the Society unanimously passed the following resolution :—

'That the Society feel deeply indebted to Sir Benjamin Brodie for the care he has continued unremittingly to bestow on the interests committed to him as President, and desire to record the expression of their sincere regret for his retirement, and for the cause which has led to it.

'You are well aware how thoroughly that expression of thankfulness was deserved. I shall never forget his great anxiety that the Council might be able to propose a suitable successor, and that the choice might be unanimous. Indeed, he thought much of the Society's affairs in the midst of his own great troubles.

'In 1861, he was re-elected into the Council, and appointed a Vice-President, and so continued to his death.

'When the Royal Society appointed scientific committees, in 1838, Sir Benjamin became chairman of the committee on 'Zoology and Animal Physiology.' He continued to be chairman until 1849, when standing scientific committees ceased to be appointed.'

On his retirement from the Council of the Royal College of Surgeons, in May 1862, the Council passed the following resolution :—

'The Council, in accepting the resignation of Sir Benjamin Collins Brodie, express their unfeigned regret at the loss of his services in maintaining at all times the dignity and efficiency of the College. At the same time, they have to record their estimation of his high professional character, evinced by researches which have contributed to enlarge the boundaries of science, and enhanced by offering, in the course of a long and successful career, an example of conduct calculated by its adoption to elevate the surgical profession in the respect and esteem of society. The Council fervently trust that Sir Benjamin Brodie may long enjoy the well-earned fruits of his unblemished reputation, and the priceless satisfaction of having conscientiously discharged his duties.'

With St. George's Hospital his connection was partially maintained until his death, as he was a Trustee of the Institution.

The following resolution was unanimously adopted at the meeting of the Weekly Board of October 29, 1862:—

'The Weekly Board of St. George's Hospital beg to express their most sincere condolence and sympathy with the family of Sir Benjamin Brodie on their recent irreparable loss.

'The brilliant career of Sir Benjamin Brodie has been graced by every honour which unrivalled skill and science could obtain for an English Surgeon, and the Governors of St. George's Hospital, with the strongest feelings of affection and gratitude for his eminent services during more than half a century, as Surgeon and Teacher, and as Trustee, are confident that the Institution which he always warmly loved, will even yet long continue to profit by an association with his character and name.

'It was chiefly in the wards of this hospital that his unwearied industry and observation enabled him to accumulate that store of sound practical knowledge which was imparted with admirable simplicity and clearness to the students, and which has greatly advanced the art of surgery itself.

'In the valuable museum, which he generously devoted to the use of St. George's Hospital Medical School, may still be seen the proofs and results of the doctrines which he taught in his lectures and writings.

'But, above all, the Governors look for the permanent influence of his instructions in the high principles of professional conduct, —the uniform kindness and consideration for others,—the laborious search after knowledge, from feelings of usefulness and duty, as well as from love of science,—ever consistently shown in Sir Benjamin Brodie, and strongly inculcated on his pupils in the exercise of their skill and talents,—which have thus been propagated through them to all parts of the British Empire.'

On the first anniversary meeting of the Royal Society after Sir Benjamin Brodie's death, the President, General Sabine, spoke as follows:—

'In addressing you for the first time from this chair as the President whom you have honoured by your choice, my first duty must be the mournful one of expressing our deep regret at the loss we have sustained of the eminent person who preceded me. To the highest professional distinction and the scientific attainments appertaining thereto, and to the indispensable moral qualities of truth, justice, and candour, Sir Benjamin Brodie united other qualifications also highly befitting the office in which you placed him:—remarkable firmness and decision, accompanied by kindliness and urbanity, and an unusually extensive acquaintance with the sentiments and opinions of different classes of society, particularly of those who cultivate Literature and the Arts. The failure of his health and of his sight deprived us latterly of that habitual attendance at the Meetings of the Society, which he regarded as a duty and valued as a privilege. Whilst we mourn the loss which we have sustained by his decease, we have the gratification of knowing that he deemed the Presidency of the Royal Society the crowning distinction of his most honourable life.'

In a biographical notice, the President of the Royal Medical and Chirurgical Society; Dr. Babington, observes:—

'As a practical surgeon Sir Benjamin Brodie attained a success far beyond that of most of his contemporaries, and this he seems to have owed, not to personal appearance or manner, not to eccentricity, not to an unusual display of courtesy on the one hand, or of bluntness and brusquery on the other, but to the legitimate influence of a high order of intellect, thoroughly devoted to the practical application of the stores of surgical knowledge acquired by his assiduity and experience—to the sound, well-considered and decided opinions which his patients were sure to obtain from him, and to the confidence which his high religious principles and his strict morality inspired. We have seen that he was employed by the Court of three successive Sovereigns; we may add that he was not only consulted by the élite of the nobility and gentry of the land, but that, on more than one occasion, his judgment was resorted to by the advisers of the Crown in cases of public importance connected with the administration of justice. This same character for probity and judgment, and a philosophical spirit likewise placed him at the head of the Council of Medical Education, and raised him to a position, as President of the Royal Society, such as no surgeon had ever filled.

'Many here present may have had better opportunities than I of forming an estimate of his domestic virtues. For myself, I can only say that I never knew a more single-minded and upright character, one more free from affectation or presumption, who expected less deference or deserved more, or who more completely impressed me with a belief that the main object of his efforts, that which was always uppermost on his mind was, wholly irrespective of self, to benefit those by whom he was consulted.'

He was connected with foreign societies as—Foreign Correspondent of the Institute of France; Foreign Associate of the Academy of Medicine of Paris; Foreign Member of the Royal Academy of Sciences of Stockholm, of the National Institution of Washington, &c., &c.

The University of Oxford conferred upon him the honorary degree of D.C.L.

'The Lancet,' in a lengthened memoir, had the following remarks:—

'The profession will learn with universal and profound regret, that Sir Benjamin Brodie died on Tuesday last, the 21st of October, at the ripe age of eighty years. In his decease one of the greatest luminaries of modern medical science has departed from amongst us. The old will feel his loss as that of a companion and friend; the middle-aged, as of one to whom they had in past years been accustomed to look for counsel and aid in the arduous duties of professional work; the young, as of one to whom reverent admiration was due; and all will feel that his death deprives British Medicine and Surgery of its greatest pride and ornament. For nearly a quarter of a century he had, as it were, reigned supreme, and he had carried into his honourable retirement the love of all who knew him, and the affectionate respect of the whole medical and general public. . . . .

'We cannot enumerate all the professional contributions of Sir Benjamin. His various labours show him to have been one of the most incessant and indefatigable workers of his time. If his practice had been the most moderate, his other works would have given him a great reputation; but our respect for his genius and industry becomes unbounded when we consider that the multifarious duties of an immense practice occupied him from an early period of his professional career. Those who knew Sir Benjamin, know him to have been most punctilious in the discharge of his hospital duties to the sick. . . . .

'During the entire term of his presidency of the Royal Medical and Chirurgical Society, we believe that he was not absent on a single occasion, and this is no small praise to a surgeon in his extensive and laborious practice. But it was after the reading of a paper that he was particularly great. Acting up to his axiom, that the debates in the Society constituted its most important and interesting feature, he always encouraged discussion. He would wait for a few minutes to see if any fellow was inclined to begin, and if he was disappointed in this, after calling attention to some of the more prominent and salient points in the production before them, he would lead the way by giving his own opinions and experience on the subject-matter. Few of those who had the pleasure of hearing him will forget with what precision he spoke; how completely he kept *ad rem*, and how easily he brought his vast experience, and that, too, without preparation, to bear upon the production of the author, whoever it might be. We scarcely recollect a single evening during the two sessions that Sir Benjamin presided in which he did not address the meeting. He seemed not to be at a loss on any subject, and no one could help being astonished, no less at the extent of his acquirements, than at the facility with which they were made available. He was remarkable, also, in keeping the various speakers within bounds, for whilst he was a staunch friend to discussion to its legitimate extent, he could not tolerate discursive flights,

> "To show the stretch of human brain,
> Mere curious pleasure or ingenious pain."'

In reviewing the life of Sir Benjamin Brodie, the 'British Medical Journal' observes:—

'In writing the life of such a man as Sir Benjamin Brodie, that which affords most ground for reflection and comment is the question—By what means did he gain and maintain that exalted position both with the profession and the public which he enjoyed without interruption for so many years? If we take into consideration his character as a man of science and as a surgeon, we find a high manifestation of observant power and of industry, joined throughout with a desire to make his labours subservient to the advancement of his profession in the knowledge of the removal of disease and the saving of life and limb. Here he obviously set a good example and did much good. But when other men are found approaching or even equalling him in his scientific acquirements and labours, and yet falling far short of him in public esteem and confidence, we are compelled to look further for the foundations on which his reputation was based. He would under any circumstances have enjoyed a very fair reputation as one of the pioneers in the experimental physiology of the present century, and would have stood in the highest rank among those surgeons who see some higher vocation in surgery than the mere use of the knife; but all this would not have gained him the esteem which belongs to the great and the good man, unless the whole tenour of his character had been uniformly honourable and straightforward—unless he had sought, by example as well as by precept, to gain for his profession the respect of all both within it and without.

* * * *

The intellectual life of Sir Benjamin Brodie, as we have elsewhere hinted, is capable of being considered under a threefold aspect. In his younger days, he gains distinction as an able experimental physiologist; in middle life, we find him reaching and holding the highest place as a surgeon of judgment and skill; and, in his old age, he displays an acquaintance with mental philosophy, such as is rarely manifested by those who have spent the greater part of their lives in such practical pursuits as that of the surgeon. Yet, though his life presents this triple aspect of the man of science, the practical surgeon, and the philosopher, there is throughout all these apparently separate phases something in common—there is in all the same spirit of observation and enquiry, and the same desire to impart a practical value to the work done.

* * *

‘So far as one man may be taken as the type of a profession, Sir Benjamin Brodie was in his own person an example of the station to which the medical profession might be brought through the intelligence and industry and integrity of its members. On all public questions where a medical opinion was required, Sir Benjamin Brodie was sure to be consulted; and his advice always carried weight. Among the latest instances of this was the Smethurst case, where he procured a reversal of the sentence of death.

'Notwithstanding the high and universal confidence in which he was held, ambition for places of public distinction was foreign to his character; and in regard to the offices which he held, he presented an example of conscientiousness which is too rarely followed. At the passing of the Medical Act, a rumour was current that he was to be raised to the peerage. No man in the medical profession would have been more worthy of it; but he himself expressed most strongly his objection to such a step, as quite unsuited to the simplicity of his tastes and habits. He was more than once asked to stand as a representative in the House of Commons; but always declined any such offer, feeling that it was impossible to perform the duties of a member of parliament and at the same time to continue to perform his duties to his patients. Throughout his life he acted on the principle of never holding an office when he could not give the time and power necessary to the due performance of the duties. He resigned his hospital appointment at the early age of fifty-six, having been full surgeon only eighteen years, because he could no longer attend to the duties. He resigned on the same principle his Examinership in the College of Surgeons. When, too, he found that his failing eyesight rendered him incapable of performing the duties of President of the Medical Council, he resigned that office; and eventually, for the same reason, retired from the Presidency of the Royal Society. This latter office he considered the greatest honour that had been conferred upon him; and, as he himself observed when a peerage was spoken of, he prized it above any peerage.'

Dr. Acland, Professor of Medicine in the University of Oxford, concludes a most interesting memoir thus:—

'As a scientific man his several works were marked by distinctness of purpose, adaptation of means to end, and rigid determination to conclude no more than observation completely justified. His relations to other scientific men may be best understood by recalling the just, courteous, and candid manner in which he conducted the business of the various societies whenever he was called upon to preside, and the lucidity with which he kept the main points before a meeting. He always advocated and supported open discussion, and in this way did good service to the Royal Society.

'As an author, he was not voluminous; nor did he speak much in public. He discarded all arts of style, aiming solely at precision and brevity: he wrote, as he spoke, only when duty called, or when there was something which he believed he could write or say well.

'He was well versed in the literature of his profession and of those sciences which interested him; but he had not much love for books as instructors in his calling, because he knew that observation and reflection were of more service than reading for the formation of the scientific mind, and original knowledge more valuable than that which is secondhand. He himself used books, and so advised younger men to use them, rather to gain the knowledge of what had been done, and as an aid towards actual observation and reflection, than thereby to educate themselves. His belief that observation, practice, and thought are the chiefest means for self-training in science partly accounts for the brevity of his published works, and greatly enhances their value.

'As a surgeon, he was remarkable from early life for the scrupulous care which he bestowed on the investigation of the cases entrusted to him. This obtained for him in a few years rare quickness as well as precision in the formation of his opinion. When Sir Astley Cooper's practice declined, he was for many years extensively called upon to act as an operator. He excelled in that department of his art; for he had every requisite for success—knowledge, coolness, and the quick imagination which prepares for almost all possible emergencies that can occur, and suggests at once expedients when any come unforeseen. He did not, however, give the highest place to this part of his professional duties; for, in an occupation in which intellectual power and practical skill are combined, he valued those parts the most in which the most intellectual power is evoked. At the same time he was ready and ingenious in mechanical contrivances, and had the neatness and the method so requisite for a good surgeon. It was characteristic of his mind, that, among a few valuable lectures on some important subjects which he collected into a volume, he has given a place to one on corns and bunions—showing that in his judgment a small evil which can produce great annoyance requires as much consideration in its turn as more serious disorders. In truth, as the great aim of his life was to prevent or to cure disease, that which was curable, though trifling, would in one sense attract his notice more than that which was already irremediable. At the same time, his difficulty in coming to the conclusion that there was nothing to be done in even the gravest case, was a marked feature in his hopeful mind.

'But the character of Brodie can be only properly considered as a whole. Neither as scientific man, nor as surgeon, nor as author was he so remarkable as he appears when viewed as he was—a complete man necessarily engaged in various callings. It was impossible to see him acting in any capacity without instinctively feeling that there he would do his duty, and do it well. Nor could he be imagined in a false position. A gentleman, according to his own definition of that word, 'he did to others that which he would desire to be done to him, respecting them as he respected himself.' Simple in his manners, he gained confidence at once; accustomed to mix with the poorest in the hospital and with the noblest in their private abodes, he sympathised with the better qualities of each—valued all, and despised nothing but moral meanness. Though as a boy he was retiring and modest, he was happy in the company of older persons, and, as he grew older, loved in his turn to help the young. 'I hear you are ill,' he wrote once in the zenith of his life to a hospital student of whom he did not then know much; 'no one will take better care of you than I; come to my country house till you are well;' and the student stayed there two months. He was thought by some reserved—he was modest; by others hasty—he valued time, and could not give to trifles that which belonged to real suffering; he was sometimes thought impatient, when his quick glance had already told him more than the patient could either describe or understand. Unconscious of self, of strong common sense, confident of his ground or not entering thereon, seeing in every direction, modest, just, sympathetic, he lived for one great end—the lessening of disease. For this object no labour was too great, no patience too long, no science too difficult. He felt indeed (to use his own words on the day of his election as President) 'his happiness to be in a life of *exertion*.' As a professional man he valued science because it so often points the way to that which is practically useful to man; but as a scientific man his one object was the Truth, which he pursued for its own sake wholly irrespective of any other reward which might or might not follow on discovery. He had not the common faults of common men, for he had not their objects, nor their instinct for ease, nor their prejudices: though he became rich, he had not unduly sought riches; though he was greatly distinguished, he had not desired fame; he was beloved, not having courted popularity. What he was himself, that he allowed other men to be, till he found them otherwise. He saw weak points in his profession, but he saw them as the débris from the mountains of knowledge and of wisdom, of benevolence and of self-denial, of old traditional skill ever growing and always purifying,—those eternal structures on which are founded true Surgery and Medicine. If ever he was bitter in society, it was when they were undervalued; if ever sarcastic, it was when the ignorant dared presume to judge them.

'A light is thus thrown on his even career of uniform progress. Training his powers from youth upwards, by linguistic and literary studies, by scientific pursuits, by the diligent practice of his art, by mixing with men, he brought to bear on the multifarious questions which come before a great master of healing, a mind alike accustomed to acquire and to communicate, a temper made gentle by considerate kindness, a tact that became all but unerring from his perfect integrity. He saw that every material science conduces to the well-being of man; he would countenance all, and yet be distracted by none. He knew the value of worldly influence, of rank, of station when rightly used; he sought none, deferred excessively to none; but he respected all who, having them, used them wisely, and accepted what came to himself unasked, gave his own freely to all who needed, and sought help from no one but for public ends.

'A few words only may be added on the inner life of his later days. Those who knew him only as a man of business would little suspect the playful humour which sparkled by his fireside—the fund of anecdote, the harmless wit--the simple pleasures of his country walk. Some, who knew these, might not have imagined another and deeper current which flowed unheard when neither the care of his patients nor his literary pursuits or memories engaged his mind. He who from his early professional life sat down every night, his work ended, his notes entered, his next day ordered, to ask what could have been better done to-day and what case otherwise managed, was not one to reach threescore years and ten without a keen onward gaze on the entire destiny of man. Yet he who realised in his profession the answer of Trophilus the Ephesian to the question, Who is a perfect physician?—'he who distinguishes between what can and what cannot be done'—such a man would not dogmatise on what cannot be known, nor would he, so humble, attempt to scan the Infinite. But his nature yearned for some better thing to come; and yearning, it became satisfied. He had for many years thought and conversed among his friends on facts he had noted in relation to our mental organization. In the year 1854, he published anonymously a volume on 'Psychological Enquiries.' This was followed by a second, with his name, in 1862. These volumes contain little that is actually new to professed psychologists; but they are the conclusions of one who had thought and worked—variously, consistently, practically. Living not in the closet, but hearing the opinions of every party and of every kind of men—liberal in all his views—without prejudice, and ever open to conviction, yet tinged with a general dislike to change as such,—he tells in these volumes what he had concluded concerning the mind of man—its laws, its discipline, its future state. They, therefore, who value such a character will prize these writings for qualities other than the novelties they may contain. It will be remembered that the scientific enquiries of his early life related to the influence of the nervous system on certain parts of the animal economy. To the ordinary physiologist this may be a purely material question; to him it was not so. In middle life he said to a friend, speaking ot his lectures on the Comparative Anatomy of the Brain, 'the complexity of the mechanism of the higher brains is enough to make one giddy to think of it.' A fortnight before his death he talked to the same person of this mysterious link between our consciousness and our visible material organization, descanting with keen interest on the relations between mind and body, and the mutual reactions of one on the other. As he then lay on his sofa almost for the last time, in great pain, having scarce for many months seen the outer world which had been so much to him, and to which he had been so much, he spoke freely of our ignorance as to many things which it would be a joy to know—of the existence of evil—of the too little attention which philosophers had paid to the terrible nature of physical pain—of the future state. So gathering up the teachings of his useful life, and still, as ever, looking forward, he waited its close. Not many days after this he breathed his last, at Broome Park, on October 21, 1862, in possession of the full calm power of his disciplined mind to within a few hours of his death.

'Such was our late President. They who knew and honoured him, may excuse, while they accept, a delineation too feeble for so complete a man. In the quality of his mind he was not unlike the most eminent of his contemporaries, Arthur, Duke of Wellington. Those who did not know him, and who do not appreciate the power requisite to make such a master in medicine as he was, may be surprised at the comparison. Yet our great soldier might have accepted the illustration without dissatisfaction. Whatever art Brodie undertook, if he has been correctly drawn, he would have entirely mastered. The self-discipline of the strongest man can effect no more. The care with which the two men compassed every detail and surveyed every bearing of a large question, the quiet good sense, the steadiness of purpose, the readiness of wide professional knowledge in critical emergencies, were in each mind alike. The public and his profession esteemed Brodie as the first in his art. He advised three successive Sovereigns, and from one had the only other mark of esteem which a Sovereign can bestow—a Title.'

I venture to make one more quotation to show what influence Sir Benjamin Brodie's character had on foreigners. M. Geraldès, of Paris, in a remarkably well written and correct memoir, which he delivered as President of La Société de Chirurgie, of Paris, of which Sir Benjamin was a member, says :—

'L'influence de Sir Benjamin Brodie contribua beaucoup à perfectionner l'état de la Chirurgie Anglaise, à élever le niveau des études chirurgicales et à agrandir les horizons scientifiques. La pente philosophique de son esprit le porta de préférence aux études profondes, à la culture des sciences et des lettres; il s'attacha avec prédilection aux travaux où l'intelligence joue un rôle principal; aussi, dans son service d'hôpital et dans sa pratique civile, il brilla plutôt par les solides et éminentes qualités du clinicien que par l'éclatante habileté de l'opérateur. La chirurgie était pour lui une science, ayant pour principale mission d'étudier les causes et la nature des maladies, de rechercher les voies et les moyens les plus rationnels pour modifier et détruire les diverses lésions ou troubles fonctionnels; cette grande et noble mission ne devait pas être sacrifiée à ces allures théâtrales, à ces opérations impossibles, à ces manœuvres opératoires brillantes et hardies qui frappent et séduisent, mais qui occultent parfois une instruction clinique insuffisante.'

The health of Sir Benjamin Brodie, up to a late period of his life, had been extremely good. In 1834, while in the Isle of Wight, he fell from a pony and dislocated his right shoulder—in which joint, long afterwards, disease showed itself. In July 1860, his vision being impaired, he found it necessary to seek advice. He submitted to iridectomy on both eyes, performed under the influence of chloroform; afterwards to extraction of a cataract; and finally to an operation for an artificial pupil. Any hopes that may have been entertained as to the success of these operations were not to be realised. His general health, however, continued in a fair state; and in the winter of 1861-62, he was in London. While there, he attended the meeting of the Royal Medical and Chirurgical Society, for the purpose of voting an address of condolence to the Queen on the death of the lamented Prince Consort; and after the address had been read by one of the secretaries, moved its adoption in a speech in which he passed a high eulogy on the acquirements and character of the Prince. This was his last appearance on a public occasion. At the end of April he returned to Broome Park; and in a few days was seized with severe lumbago, followed by a protracted attack of fever. About July he began to complain of pain in the right shoulder as well as of much prostration; for which he went to the seaside. The pain in the shoulder increased, being attended with feverish symptoms. In the early part of September, a swelling, it was feared of a malignant character, appeared in the shoulder, and gradually increased; and on October 21 he died, remaining perfectly conscious to within a few hours of his death. For the malady connected with his vision he had the benefit of Mr. Bowman's advice, who performed the different operations on his eyes. During his last illness, he was attended by the late Mr. Peter Martin, of Reigate, and myself; and before the termination of his life we had the benefit of the advice of Dr. Watson, Mr. Hodgson, Mr. Cæsar Hawkins, and Mr. Cutler.

He was buried in the churchyard of Betchworth, the parish in which Broome Park is. With the exception of the attendance of the President of the Royal Society, the Presidents of the Colleges of Physicians and Surgeons, and the senior surgeon of St. George's Hospital, the funeral was strictly private, attended only by his family and a few intimate friends.

No public memorial has yet been raised to this great surgeon. When the Wellington Despatches appeared, a distinguished foreigner remarked, 'What a noble monument Colonel Gurwood has raised to the Duke—one more enduring than marble or brass.' The task of arranging such a monument to the best of friends and most indulgent of instructors has been to me a labour of love.

CHARLES HAWKINS.

THE WORKS

OF THE LATE

SIR BENJAMIN BRODIE,

BART.

AUTOBIOGRAPHY.

I KNOW but little of my father's family. My paternal grandfather was, I believe, born in Banffshire, somewhere about the year 1710 or 1711. He came to London a very humble adventurer, having, as there was reason to believe, been involved (in those days of Jacobitism) in some political trouble. He married a daughter of Dr. Peter Shaw, a physician, and first cousin of another Dr. Shaw, who was an eminent medical practitioner, and whose daughter married the first Dr. Warren. Dr. Peter Shaw had followed the fortunes of the Stuarts, and, if I am not mistaken, had accompanied King James II. abroad. My grandfather is described by Dr. Denman, who married one of his daughters, as an army-clothier ; but he also had some post in the Stamp-office, which fact I have learned from some letters which I have in my possession of my father's to his sisters, addressed under cover to my grandfather to save the postage.

My father scarcely ever spoke of his own family, and what little I know of them is chiefly derived from my unmarried aunt, Margaret Brodie. The supposition that my grandfather had become involved in some political difficulties is rather confirmed by the circumstance of his having married afterwards the daughter of a stanch Jacobite, and by the Jacobite songs which my before-mentioned aunt was accustomed to repeat to us when I was a child. The only relations with whom he kept up any communication were a naval Captain, I believe afterwards Admiral, Brodie, who, as my aunt used to report to us, had two very handsome sons, and Mr. Brodie of Brodie, who held the office of Lord Lyon. From his connection with the latter I conclude that we are of the family of Brodie of Brodie. Of his own immediate family I know nothing, except that after his death two of his nephews came to London, apparently knowing nothing about him, on the speculation that there might be something for them to inherit, departing, however, at once on finding that he had left a family, and that there was nothing for them: being never heard of afterwards.

My paternal grandmother had the reputation of being a person of very considerable abilities, and I have formerly seen some of her manuscripts which seemed to prove that this was really the case. My aunt used to boast that we had somehow Royal blood in our veins (that of the Plantagenets), an honour which my friend Charles Edward Long has shown to be shared by many thousand persons of various grades from princes and dukes down to cobblers and carpenters.

My father was educated on the foundation at the Charterhouse, and afterwards at Worcester College, Oxford. As a boy he was patronised by the first Lord

Holland, and passed much of his time at Holland House. On leaving the University he took holy orders, and it seems from some letters of his which I have in my possession, that at one period he held a curacy at Adderbury, in Oxfordshire. He remained there, however, only for a short time, and when Stephen the second Lord Holland purchased an estate and mansion at Winterslow in Wiltshire of one of the Thistlethwayte family, he rented a cottage in the same place, in order that he might be near him. From his letters to his sisters written at this period it appears that he lived almost constantly with Lord Holland, to whom, as well as his brother Charles James Fox, he was sincerely attached, always speaking of them (especially of the former) even to the last days of his life with the greatest affection.

Lord Holland died in 1774, having directed in his will that my father should have offered to him the presentation of the first of three livings which he had in his gift which should become vacant. The vacancy soon occurred in consequence of the death of the Rev. Dr. Thistlethwayte, the incumbent of Winterslow, and thus my father became the rector of the parish in which he had previously resided.

In the year 1775 my father married one of the daughters of Mr. Collins of Milford, a banker at Salisbury. They had six children, four sons and two daughters, and I was their fourth child, having been born in the year 1783.

My earliest recollections carry me back to the Rectory at Winterslow. They are still as vivid as ever, and even now my dreams continually present to me these scenes of my early life.

My father was altogether remarkable for his talents and acquirements. He was well acquainted with general literature, and was an excellent Latin and Greek scholar for the period in which he lived, when a critical knowledge of the Greek language was not so far advanced as it is at the present time. He was endowed with a large share of energy and activity; but looking back at this early period of my life I cannot doubt that he was a disappointed person. In the beginning of his career he had reason to expect that he would rise high in his profession; and there is little doubt that his expectations would have been realised if Mr. Fox had continued longer in power. As it was, his first preferment was his last. He paid great attention to the duties of his parish, and knew every one of the seven hundred or eight hundred individuals belonging to it. But besides this he attended more than any one of the neighbouring gentry to the public business of our part of Wiltshire, as a magistrate and deputy-lieutenant, and in other ways. Thus he acquired a considerable local influence beyond that which with his moderate fortune he would have acquired otherwise.

He held what is commonly called a very good living; and my mother, not many years after her marriage, inherited a fortune of 10,000*l.* as her share of her father's fortune; to which ultimately there was an addition of some thousands of pounds from other parts of her family. My father was very anxious that his sons should be well educated. But with his means he found that he could not afford to send us all to public schools, and as he did not like to send us to schools of an inferior order, he determined, in addition to his other undertakings, to instruct us himself. For many years this was indeed the principal object of his life, and I cannot too strongly express my gratitude for the thought and labour which he bestowed on the cultivation of our minds.

My elder sister, who afterwards married the Rev. Mr. Marsh, chancellor of the diocese of Salisbury, was educated with her brothers. She was well acquainted with Greek and Latin, and afterwards instructed her own children in those languages previously to their being sent to Westminster School. Being seven years my senior, she took some part in the instruction of myself also. When I was seven years old, my father being for a time absent from home, she superintended my first translations of Ovid, and some six years afterwards I went through Euclid's Elements with her assistance.

Our life at Winterslow was removed as far as possible from one of idleness. In the summer my brothers and myself rose at six o'clock, and two hours were devoted to study (generally learning to repeat Greek and Latin poetry, or Cicero's Orations) before we breakfasted at half-past eight o'clock. Immediately after breakfast we resumed our studies; we dined at three o'clock, and were then at our studies again from four to six o'clock. In the winter our hours of study were somewhat different; and from eight to half-past nine o'clock in the evening my father read some book of amusement or instruction aloud to the whole family. On two days in the week when my father was absent on public business, we had half holidays. We had no other vacations during the whole year, except on some grand occasions, such as a cricket match, or the first few days of the skating season. On the whole, our average time of study was from seven to eight hours daily; and there having been only very rare intermissions, the result has been that the habit of being employed in some kind of study became a part and parcel of my nature. Idleness even for a single day has been always irksome to me, and I have had little inclination for any pursuit which did not seem to lead to some ulterior object. Much of my success in my worldly career is, I am convinced, to be attributed to this discipline of my early years.

Being a large family we had a society among ourselves; and only a very limited acquaintance with the families in the neighbourhood. Indeed there were but few for us to visit. The nearest place at which we could have any acquaintance was Salisbury, and this was by the carriage road seven miles distant. Some of our cousins, however, used to come at times to stay with us for a few weeks. Among them were the present Lord Denman, the present Sir George Staunton, Colonel Squire of the Royal Engineers, who afterwards died on the Peninsula, and his two brothers. Lord Denman resided with us as a pupil of my father's for a year after leaving Eton. Referring to him at this period, I cannot but recognise in him the same character which he has preserved through life. He was a thoroughly good boy, upright and honourable as he has been ever since.* As we grew older we formed other acquaintance, and I may mention specially Mr., afterwards Dr., Maton, who afterwards became a physician of great eminence in the metropolis; Mr., now Sir John, Stoddart, who for many years filled the office of chief justice at Malta; and the late Mr. Wray, of the Chancery bar. These were ever afterwards my most intimate friends. At the present time the only one of these who remains among us is Sir John Stoddart, still retaining an active and vigorous intellect, and engaged in literary pursuits at nearly eighty years of age.*

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* Upon Sir Benjamin Brodie's resignation of the office of surgeon to St. George's Hospital, a medal was presented to him (for which see frontispiece). Upon sending one to Lord Denman I received the following letter:—

To Charles Hawkins, Esq.

'Westminster Hall: January 31, 1844.

'Sir,—I beg to assure you and the Committee for preparing "The Brodie Testimonial" that your beautiful memorial could not have been bestowed on any one who could prize it more highly.

'Let me add that I am gratified by the motives which you assign for showing me this kindness — my near connexion with eminent members of the medical profession, and the place which I have had the good fortune to reach in my own.

'But you perhaps are not aware that one of those eminent men is Sir Benjamin Brodie himself, whom I am proud to call my near kinsman and my friend through life. In our early days we were taught, and have found it true, that all honourable and beneficial pursuits are closely allied, and promote the credit and usefulness of each other.

'I have the honour to be, Sir, with many thanks, yours faithfully,

'Denman.'

Lord Denman was Lord Chief Justice from 1832 to 1850, and died 1854, aged 75.—C. H.

There were undoubtedly disadvantages belonging to the kind of life which my brothers and myself led at this period, having so little acquaintance with those of our own age and station. We had much to learn when we came into the world which others learn as boys at Eton or Harrow or Rugby. In my own case, one was a shyness in general society which for a long time was very oppressive, and which it took many years for me to overcome; and another was that, not having sufficient opportunities of comparing myself with others, I formed no right estimate of my own character, overrating myself in some things, and underrating myself in others. Yet I am inclined to think that what we gained in some respects was fully equal to what we lost in others. In my solitary walks through Lord Holland's woods, or over the Wiltshire downs, I early acquired the habit of reflection, and of thinking and judging for myself, and the consequence has been that through the whole of the after part of my life I have never been inclined to adopt opinions on the authority of others, nor until I had looked at both sides of the question. I also learned to be independent of others for occupation and amusement, and of this I have felt the great advantage ever since. In the many years previous to my marriage, during which I was climbing up-hill in my profession, when I passed what is called the empty season in London, with very few of my acquaintance left in the great city, time never hung heavy on my hands. Indeed very few portions of my life have been much happier than those in which I had no other society than that of my books and writings, and little recreation beyond that of a solitary walk in the evening in the fields which now form the Regent's Park or those which are now covered with houses and gardens in the district of St. John's Wood.

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* Sir John Stoddart, D.C.L., died in 1856, in his 85th year.—C. H.

Notwithstanding what I have said as to our want of society at Winterslow, we were not altogether without opportunities of studying the characters of others, and of learning how to deal with mankind. Education and position in society modify our tastes and sentiments and habits, but they do not alter the essential qualities of human nature, the observation of which in one class of persons cannot fail to teach us much of what we want to know as to others. In the year 1798, when there was an alarm on account of a supposed probability of invasion by the French, my two elder brothers and myself raised a company of volunteers, amounting at last to as many as 140 in number. The eldest of us was only nineteen years of age, and I myself was not more than fourteen, when, through my father's influence, we received our commissions as captain, lieutenant, and ensign. The men were clothed and armed by Government, and received pay for each day of exercise. We expended the pay which we received as officers in one way or another on the corps, principally in giving them entertainments in my father's great barn, after being inspected by the general officer of the district (or on some other occasions), to which we invited some of our friends in the neighbourhood and the farmers of our parish. I have no doubt that the pay and the dinners did much for us; still, as we were nothing but volunteers in the true sense of the word, and as each one of our soldiers could go and come as he pleased, if we had not attended to their feelings, and thus exercised an influence over them, we could never have maintained among them the necessary discipline, nor have kept up the number of our corps. I cannot look back at these boyish occupations without being satisfied that they afforded me many useful lessons by which I profited in the world afterwards. I may add that we bestowed great pains on the drilling of our corps; and, by diligently studying the system of tactics published by authority, we succeeded in obtaining for it the credit of being by far the best disciplined of any in our part of the country.

In the year 1799 my elder brother, Peter, left Winterslow to be entered at the Temple and reside as a law-student in London. My next brother, William, was at this time residing at Salisbury, it being intended that he should be brought up to the woollen cloth manufactory, for which Salisbury had in those times a reputation, which it has long since lost. In the latter part of the year 1801 I followed my elder brother to London. This interval of two years from 1799 to 1801 was a very important portion of my life. I was old enough to know that I must depend on myself for making my way in the world, and that I might never again have the same opportunity of laying in a store of general knowledge. I read a great deal of Greek and Latin, and still more in other subjects. In mathematics I never soared higher than geometry and algebra, but of these I learned enough to obtain a sufficient knowledge of mechanics, optics, and hydrostatics for ordinary purposes, and a general knowledge of astronomy. In general literature my reading was very various, including many books which might as well have been left to a later period: such as Locke's 'Essay on the Understanding;' Harris's 'Philosophical Essays;' Reid's 'Inquiry;' Priestley's 'Abridgment of Hartley's Theory;' Godwin's 'Political Justice;' Smith's 'Theory of the Moral Sentiments;' &c. I also acquired some knowledge of chemistry. I knew Lavoisier's 'Elements' by heart, and fitted up a laboratory with such simple apparatus as with my very limited means I was able to make or purchase. I read a great deal of English poetry, and some French and Italian. What I had then committed to memory of Greek and Latin and English poets has been a great resource to me since during the many long nights which I travelled by myself in a postchaise, before the invention of railways. But I cannot say that my poetical taste at that time was of the purest kind. I was a vast admirer of Darwin, and never properly appreciated Shakespeare until I had lived for some few years in the world. Looking back at these two years, the impression on my mind is that it would have been well if I had read less and digested more; nevertheless I am satisfied that they have been to me of the greatest value, and that if they could have been blotted out of my existence, my position in society would at the present time have been very different from what it really is.

My two elder brothers being away, and my third brother being several years younger than myself, the result was that during the two years of which I have just spoken, I was thrown more into the society of my father than at any former period. He had been a very strict disciplinarian, and the respect and affection which I had for him had been mixed up with no small portion of fear. But it was now much otherwise. I became to a considerable extent his companion. In the early part of the day I read with him some Latin and Greek works—generally the latter. In the afternoon and evening he left me very much to pursue my studies in my own way. Between our morning occupations and dinner-time, when I was not engaged in some business relating to our volunteer corps, and he was not engaged by his duties as a magistrate and deputy-lieutenant, which at this time were considerable, I accompanied him in his walks. Allowing for the difference of more than forty years in our ages, our tastes were a good deal similar, so that my attentions were not paid to him merely as a matter of duty. My father, as I have already mentioned, was a man of great natural talent, and had a very cultivated mind; and the fact of my being much in his society made me feel as if I was an older person than I really was, and in part explains how it happens that when I went forth into the world afterwards my sympathies were much more with those who were beyond myself in years than with those of my own age. Other circumstances, however, contributed to produce the same result. I have already referred to Robert Wray as one of my early acquaintance. He was the son of a gentleman of independent fortune at Salisbury, about five years my senior, and of a very thoughtful and reflecting turn of mind. There was a close intimacy between us, which terminated only with his death. Thus, being thrown a good deal on my own resources, I was constrained to seek amusement for my leisure hours not in the usual pursuits of boys, but in my father's library, picking up many scraps of knowledge, which I have found to be far from useless since. To those who may take the trouble of looking at these manuscripts hereafter, all this may appear very trifling and egotistical, but the truth is, that I feel an interest in looking back at these circumstances in my early life which had an influence on my tastes and habits afterwards; and it may be that something of the same kind of interest will be felt by my wife and children when I am taken from them.

As long as I can remember anything my father always endeavoured to impress on our minds that we should have to obtain our livelihood by our own exertions; that he would do his utmost to give us a good education, to accustom us to industrious habits, and to put us in the way of providing for ourselves, but that he could do nothing more. We supposed that he left us to choose our professions for ourselves, but the fact was, as I now believe, that without our being aware of it, he himself directed our inclinations. My elder brother became a lawyer, and has since obtained the highest place in his profession as a conveyancing barrister, distinguished alike for his legal knowledge, his integrity, and his accuracy.* My next brother, three years older than myself, as I have already mentioned, was first engaged in the woollen cloth manufactory at Salisbury. This, however, soon became a failing business, the Salisbury manufacturer after the introduction of steam being unable to compete with those of the coal-districts. Some years afterwards, however, he succeeded on the death of one of my maternal uncles to a very lucrative business, which had been for some generations in my mother's family, and by which my grandfather had been enabled to accumulate a considerable fortune, became the proprietor of a provincial newspaper, and a banker. He married a niece of Mr. Hussey, who represented Salisbury in Parliament, with a good fortune; and was for many years a most prosperous person, living in the best society of that part of the country. In an evil hour he was persuaded to aspire to a seat in the House of Commons. He was elected for Salisbury by a large majority; was re-elected after two pretty hard contests; and kept his seat until, after the sudden death of a managing clerk in whom he had placed a too unlimited confidence, he was led to accept the Chiltern Hundreds.*

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* Mr. Brodie died in 1854, aged 76.—C. H.

As to myself, it was determined that I should embark in some part of the medical profession. Dr. Denman had married one of my father's sisters. Dr. Baillie and Sir Richard Croft had married my first cousins. The great reputation which they had respectively acquired perhaps led my father to give my mind this direction, and disposed me to be easily guided according to his wishes. However that may have been, in the autumn of 1801 I was sent to London, and there entered on those pursuits which have been the chief object of my life.

Others have often said to me that they supposed that I must have had, from the first, a particular taste or liking for my profession. But it was no such thing: nor does my experience lead me to have any faith in those special callings to certain ways of life which some young men are supposed to have. For the most part, these are mere fancies, which are liable to give way to other fancies with as little reason as they themselves first began to exist. Such persons take the *ignotum pro*

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* Mr. William Brodie survived his brother but one year, dying in October 1863.—C. H.

magnifico; and when they find that the *magnificum* is not equal to their expectations, they as readily fly to something else. The persons who succeed best in professions are those who, having (perhaps from some accidental circumstance) been led to embark in them, persevere in their course as a matter of duty, or because they have nothing better to do. They often feel their new pursuit to be unattractive enough in the beginning; but as they go on, and acquire knowledge, and find that they obtain some degree of credit, the case is altered; and from that time, they become every day more interested in what they are about. There is no profession to which these observations are more applicable than they are to the medical. The early studies are, in some respects, disagreeable to all, and to many repulsive. But in the practical exercise of its duties in the hospital, there is much that is of the highest interest; and the collateral sciences, to those whose position gives them the opportunity of cultivating them, offer at least as much to gratify our curiosity and excite our admiration as any other branches of knowledge, not even excepting the sublime investigations of astronomy.

When I first came as an adventurer to London, I knew as little as possible of the profession for which I was destined, and I had to grope my way in it as well as I could by myself. I soon found that I could not be a physician without an University degree. My father had sent none of us to Oxford or Cambridge. I do not certainly know why he did not do so; for although, with his family of six children, his pecuniary means were limited, we were far beyond ordinary schoolboys in our knowledge of Greek and Latin; and I have known many much inferior to ourselves, as to these studies, who were able to obtain exhibitions such as, with what he could have done for us, would have enabled us to obtain an academical education, and put us in the way of rising in the University afterwards. I suspect that for these ancient seats of learning, as they were then constituted, he had no very great respect, and that he feared that we might there lose those habits of persevering industry which he had been at so great pains to give us.

During my first season in London, I attended Mr. Abernethy's lectures on Anatomy. He was an admirable teacher. He kept up our attention so that it never flagged, and that what he told us could not be forgotten. He did not tell us so much as some other lecturers ; but what he did, he told us well. His lectures were full of original thought, of luminous and almost poetical illustrations, the tedious details of descriptive anatomy being occasionally relieved by appropriate and amusing anecdotes, which, though they had been repeated over and over again, as one course succeeded another, were very agreeable to us new-comers. Like most of his pupils, I was led to look up to him as a being of a superior order, and I could conceive nothing better than to follow in his footsteps ; and thus I was led to regard the department of the profession to which he belonged as that to which I should belong myself. Of this conclusion I have never since had reason to repent; and after an experience of fifty years, I am confirmed in the opinion that the pursuit of what is called pure surgery, such as it is in large cities, in connection with a hospital and a medical school, is more replete with interest, and, on the whole, more satisfactory, than any of the other branches into which the *ars medendi* is divided.

Although I never even dreamed of retracing my steps, nor allowed myself to think that I could venture to do so, it must be confessed that there was much which tended to damp my ardour in the beginning. A very few days were sufficient to overcome the disgust occasioned by my first entry into the dissecting-room; but the study of bones and muscles and bloodvessels was far from being attractive in the first instance, after the very different studies in which I had been previously engaged. Now, in the theatre and the dissecting-room, I felt, though with numbers around me, like a solitary person. Between myself and the great majority of the students there was nothing in common. In a medical school, indeed, there is a great mixture of persons. There is always a certain number of well-educated young men. But these are a minority. The effect of the absurd system of apprenticeship to an apothecary—which custom formerly, and since that an Act of Parliament, has imposed on what are called general practitioners—is that the great mass of students are sadly deficient in this respect. If I spoke on subjects in which I was interested, they did not understand me, neither did I understand them. There were only two among them with whom I had much acquaintance: one of them a young physician of the name of Crawford, a nephew of Crawford who wrote on animal heat, and who died not very long afterwards; and the other was Lawrence, who has since acquired so large and well-deserved a reputation. The latter was, even then, a remarkable person. I never knew any one who had a greater capacity for learning than he had, nor more industry, nor who at the same age had a greater amount of information, not merely on matters relating to his future profession, but on a great variety of other subjects.

From that time to the present, Lawrence and myself have been moving in parallel lines, he having had the largest share of private practice next to myself; and it may be regarded as somewhat to the credit of both of us that there has never been any manifestation of jealousy between us. I have already mentioned that, when a young man, he had some faculties in great perfection, and he has them still, but little (as far as I can see) impaired by the addition of fifty years to his age. He has a great memory, and can readily recur to, and make use of, what he knows. He has considerable powers of conversation, but without obtruding himself to the exclusion of others, as is the case with too many of those who are reputed to be good talkers. What he says is full of happy illustrations, with, at times, a good deal of not ill-natured sarcasm. In public speaking, he is collected, has great command of language, and uses it correctly, but not equal to what he is in the ordinary intercourse of society. In writing, his style is pure, free from all affectation, yet in general not sufficiently concise. His reading has been extensive: he is well acquainted with modern, and moderately so with the ancient, languages. His professional writings contain a vast deal of information, but it is more as to what he has taken from other authors than as to the results of his own experience and observation. That he is thoroughly acquainted with his profession cannot be doubted, for it would not have been possible for him otherwise to retain for so long a period the high place which he has occupied.*

If I had but few associates among my fellow-students in the medical school, I was fortunate in those whom I had at the same time out of it.

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* Mr. Lawrence was appointed Serjeant-Surgeon at the death of Mr. Travers. He still lives to adorn the profession in whose service he has so long laboured: still performing the duties of Surgeon and Lecturer at St. Bartholomew's Hospital, with little less vigour than when he was first attached to that school, more than half a century ago.—C. H.

My elder brother was in London studying for the bar, and he and I lodged together at a house in Carey Street, Lincoln's Inn. Denman, my first cousin, was studying the law also, and had chambers in Lincoln's Inn. Merivale, with whom I was acquainted as a friend of Denman, and as having been a visitor at my father's house in Wiltshire, and who was afterwards well known for his literary acquirements, and especially as the author of the translations of the Greek Anthology, was engaged in the same pursuit, and residing also in Lincoln's Inn. Besides these, I was on intimate terms with other law students, among them Wray, with whom I had previously associated in Wiltshire; Stoddart, already mentioned as a former friend, who, after having been leading the life of a literary man, was then studying for the bar of Doctor's Commons; Gifford (Lord Gifford afterwards), and one whose name was Barwis, who, not being very successful at the bar, became afterwards the Marquis of Ormonde's agent in Ireland, and continued to be one of my best and kindest friends to the end of his days. To these I may add Dr. Maton, whom I had known in my earlier days, and whom, while I was a boy, I had sometimes accompanied in his botanical excursions. He had then lately begun to practise as a physician in London; rising afterwards to be one of the principal physicians in the west end of the town.* All of these whom I have mentioned were several years older than myself, and I hold it to be one of the greatest advantages which I have had in life, that I was thus at an early age thrown into the society of intelligent and well-conducted persons, whose minds were more matured than my own.

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* Dr. Maton was born at Salisbury in 1774, and died in London in 1835.
C. H.

Dr. Maton and some of his friends, while at Oxford, had formed themselves into a society for the discussion of literary and other subjects. The objects of the society were innocent enough, and one of their rules was to exclude all questions connected with religion and politics. But in those days, when the French Revolution was going on and parties were reckless and violent at home, it excited the jealousy of the authorities of the University, who insisted on it being put an end to. When several of the founders of it met afterwards in London, they agreed to re-establish it under the name of the Academical Society, and it accordingly assembled once in a week in apartments at a large house in Bell Yard, between Lincoln's Inn and the Temple. Dr. Maton was its president, and through his kindness, youngster as I was, I was elected a member of it. Here, besides some of my friends already mentioned, I met with several persons who have since become much distinguished in their several ways: Lord Glenelg, and his brother Robert, who died afterwards while Governor of Madras; Bowdler, Francis Horner, Dr. Bateman (author of the work on 'Cutaneous Diseases'), Sir Henry Ellis, and others. Not long after I had joined the society, a young Scotchman of uncouth appearance was admitted into it, whom very few of us knew, who at that time, while a student of one of the Inns of Court, was maintaining himself, as I believe, by reporting for the newspapers. I remember that he read an essay the object of which was to prove that war had been the great agent in civilising the world. He was an indifferent speaker, but what he said was always to the purpose. This unknown person became afterwards Attorney General, then Lord Chancellor of

Ireland, and is now the Lord Chief Justice Campbell.* The three best speakers were the two Grants and Bowdler. The latter, if he had lived, would undoubtedly have occupied a considerable place in society; but he had ill-health and died a very few years after the period of which I am now speaking. I was too shy and too much awed by the society of persons generally a good deal older than myself to take any part in the debates, except when it was my turn to open the discussion, and on these occasions my speeches had little to recommend them, except their brevity. In the first year, however, I furnished an essay on the advantages which might be derived from metaphysical enquiries. I read other essays afterwards, one on the principles of science and the mode of conducting scientific enquiries (which gained me some credit in the society), and another on what were supposed to be modern discoveries, which could be found in Pliny's Natural History. I mention these trifling matters merely because they show that, although I was really studying hard in my profession, I nevertheless found some leisure to think of other things. Ellis and myself were for some time joint secretaries or, as we were called, registrars of the society, and hence arose an intimacy between us, which has continued uninterrupted to the present day. He was then a sub-librarian of the British Museum, of which institution he has been now for many years the principal official person.†

As I have introduced the 'Academical Society,' I shall give the rest of its history, which may, however, be comprised in a few words. The most zealous of its members was our president, Dr. Maton. He regarded it as an institution for the advancement of literary and scientific knowledge, and, I have no doubt, looked forward to the time when it would occupy a high place among the learned societies of the metropolis. But it was too near to the Inns of Court for this purpose. The young lawyers especially were wont to introduce political allusions, on which occasion Maton, sitting as president, would take off the three-cornered hat which he wore according to the fashion of that day, and warn them that this was contrary to our regulations. But his warnings were gradually less and less attended to: the society assumed more and more the character of a common debating club, and our president resigned. The meetings were afterwards transferred to a larger room in Chancery Lane, and, I believe, flourished very much in their new character for a few years, then declined, and died a natural death. In fact, the altered habits of society have not been favourable to these evening meetings. In the beginning of the century lawyers dined at half-past four or five o'clock, and had long evenings. In like manner the Royal Society Club dined at the Crown and Anchor at five o'clock, and made a full attendance at Somerset House afterwards. But now, when few persons of the best educated classes dine before seven o'clock, the meetings of the Royal Society are scarcely attended, there being not unfrequently no more than twenty or thirty of the Fellows present, or, as the French say, *assisting* on these occasions.

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* Lord Campbell died Lord Chancellor of England June 23, 1861, in his eighty-first year.—C. H.

† Lord Glenelg and Sir Henry Ellis alone survive.—C. H.

During my first winter in London, I attended Mr. Abernethy's lectures on anatomy, and worked in the dissecting-room, and attended Dr. (now Sir Alexander) Crichton's lectures on chemistry every other morning.* My time was not so much occupied but that I had leisure for some other pursuits. I read the first volume of Dugald Stewart's 'Moral Philosophy,' which was then lately published, and Berkley's 'Dialogues and Principles of Human Knowledge,' which last I obtained for the sum of half a crown at a book-stall. If I were called upon to name the author from a perusal of whose works I have derived the most advantage, I should mention Berkley. Of course I refer not to his hypothesis of the non-existence of the material universe, but to the example which he affords of clear, precise, and accurate reasoning, combined with a simple, unaffected, and perspicuous style. At another book-stall I found his 'Treatise on Tar-water,' of which I read as much as I could. Full as it is of learning, I wondered at that time, as I wonder still, that the author of the 'Principles of Human Knowledge' and the 'Essay on Vision' should have produced another work with so many strange conceits and illogical conclusions as the '*Tar-water*.' Berkley's metaphysical head seems to have been totally unfitted for mere physical researches.

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* Sir Alexander Crichton was physician to the Emperor of Russia, and resided at St. Petersburg for many years. He died at Sevenoaks in Kent June 4, 1856, aged ninety-two.—C. H.

On the whole, the beginning of my London life was agreeable enough, though it formed a strange contrast to the quiet of my father's house. In the spring of 1802 I returned to Winterslow. I had never been absent before for more than a fortnight at a time, and once only even for so long a period as this. I began at last to suffer from a kind of nostalgia, and I shall never forget the delight which I felt when, seated in the little Salisbury coach, which performed its journey of eighty-two miles in about thirteen hours, I once more breathed the country air, and looked out on green fields and trees, or recognised the scenes of my boyhood gradually disclose themselves as I walked from the Winterslow hut (two miles off) to my father's house.

During the following summer (1802), I passed my time much as I had done formerly. I thought, however, that I ought to do something towards advancing my professional knowledge, and, accordingly, I borrowed Benjamin Bell's 'System of Surgery' from Mr. Wyche, one of the surgeons to the Salisbury Infirmary. I found it, however, a most unreadable production; indeed, I doubt whether it was ever read by any one. Yet, somehow, it had a sort of reputation in its day, which, I imagine, is to be attributed to it being the work of a leading surgeon in Edinburgh, and to its consisting of some half-dozen thick octavo volumes.

In the autumn I returned to London, and to our former residence near the Inns of Court. My elder brother, who had been staying in London during the summer, was a favourite pupil of Mr. Charles Butler, the eminent conveyancer, and the author of several literary works. Mr. Butler's family were at this time on the Continent (during a part of the short peace), and my brother having been ill, Mr. Butler very good-naturedly insisted on his staying with him at his house in Great Ormond Street. This introduced me to his acquaintance. He took, somehow, a liking to me, and from that time to the day of his death treated me with the greatest kindness. During the following winter I attended Mr. Wilson's lectures in Great Windmill Street, and worked hard in his dissecting-room. For learning anatomy, Mr. Wilson's school afforded much better opportunities than that of my former teacher. He had a most profound knowledge of his subject, and his demonstrations were very far superior to those of any other anatomist of that day; and I may, I believe, add, to those of any one since. He kept up the attention of the diligent students, who were really anxious to learn, not by the aid of happy illustrations and appropriate anecdotes, but by the quantity of instruction which he conveyed. For those of an inferior class, his lectures were almost too good. With them, a neighbouring teacher, who was more of a private tutor than an anatomist (*nomine* Carpue), was more popular.

During this my second, as well as my first, winter in London, my professional studies were wholly limited to anatomy, except that in the early part of it, and afterwards, when I had no subject for dissection, by Dr. Baillie's advice, I attended in a chemist's shop, in order that I might gain some knowledge of the Materia Medica, and the making up of prescriptions. The shop was at the corner of Little Newport Street, and the proprietor of it was Mr. Clifton, who also practised as an apothecary, exercising his art among the tradesmen of the neighbourhood. He was an apothecary of the old school, having no science in the ordinary sense of the word ; yet, I have no doubt, an useful and successful practitioner. I come to this conclusion because, although there was nothing prepossessing in either his manner or appearance, his practice gradually increased, until at last he was able to give up his shop and live in a large house near Leicester Square, where he dispensed medicines only to his own patients. It is usual in these days to regard this class of practitioners with little respect; but the fact is, that they were very useful persons, and, having no very ambitious aspirations, they were within the reach of the poorer orders of society, which is not much the case with the better educated surgeon-apothecaries, or, as they are called, general practitioners, of the present day, who have expended a considerable sum of money in order to obtain a license to practise. Mr. Clifton's treatment of disease seemed to be very simple. He had in his shop five large bottles which were labelled *Mistura Salina*, *Mistura Cathartica*, *Mistura Astringens*, *Mistura Cinchonæ*, and another, of which I forget the name, but it was some kind of white emulsion for coughs; and it seemed to me that out of these five bottles he prescribed for two-thirds of his patients. I do not, however, set this down to his discredit; for I have observed that while young members of the medical profession generally deal in a great variety of remedies, they generally discard the greater number of them as they grow older, until at last their treatment of diseases becomes almost as simple as that of the Æsculapius of Little Newport Street. There are some, indeed, who form an exception to this general rule, who, even to the last, seem to think that they have, or ought to have, a specific for everything, and are always making experiments with new remedies. The consequence is that they do not cure their patients, which the patients at last find out, and then they have no patients left.

During my attendance at the Windmill Street school I worked hard in the dissecting-room, and learned a good deal of anatomy. If I did so, however, it must be owned that it was rather as a duty, and because it was necessary to my future undertakings, than because I had any particular taste for the details of anatomical study. I remember some years afterwards dining with a friend (Henry Drummond, the present member of Parliament for West Surrey), who was a craniologist, at the Athenæum, when he told me that he saw that I had the organ of constructiveness much developed, and that this explained how it was that I excelled in the use of my hands, and was an excellent dissector. There was never a greater mistake. I was naturally very clumsy in the use of my hands, and it was only by taking great pains with myself that I became at all otherwise.

During this my second winter in London, I made only one acquaintance with whom I was at all intimate among my fellow-students, in the person of Mr. Rose, who ultimately became a surgeon of the same hospital with myself, and is still well known by a very valuable paper published in the 'Medico-Chirurgical Transactions.' Rose was a nephew of Dr. Reid, the author of the 'Enquiry into the Human Mind on the Principles of Common Sense,' and had been educated by him at Glasgow. From thence he was transplanted to Oxford as one of the Glasgow exhibitioners at Balliol, and then to London as a student in surgery. We lived very much together, and our friendship continued without a day's interruption until his death, about twenty-five years afterwards. He was a thoroughly honourable, high-minded man, having little imagination, but a very clear head and sound judgment. I have no doubt that my intimacy with him tended very much to the improvement of my own character, and I look back to the friendship which existed between us as one of the most happy circumstances of my life. This excellent man belonged to a family who had a tendency to pulmonary disease. In the year 1828 he had the misfortune to lose three out of four children from the effects of scarlet fever. This broke his heart. The disease of which his brothers and sisters had been the victims became developed in himself, and he soon followed his children to the grave.

In the spring of 1803 I first entered as a pupil under Mr., afterwards Sir Everard, Home, at St. George's Hospital.

At this time Mr. Home was the leading surgeon at the west end of London. He was looked up to with something like veneration by all the hospital pupils. He was punctual in his attendance, performed his duties with great ability, and was far above all his colleagues, both in his diagnosis of disease, and as an operating surgeon. As a practical surgeon, I do not think that Mr. Thomas Keate, the senior surgeon, was at all his inferior; indeed, the latter had rather an advantage over him in the medical treatment of his patients. But Mr. Keate occupied what at that time was a very high station as surgeon-general to the army. In the time of war this was a place of great responsibility, with the disadvantage, for so it is, of a very extensive patronage. Partly in consequence of his time being thus very much occupied, and partly from being naturally of unpunctual habits, he was negligent of his hospital duties, and he was not estimated as, with his talents and knowledge, he would have been otherwise.

I had now left my old lodgings, where I lived with my brother Peter, in Carey Street, and resided in the neighbourhood of the hospital, in order that I might be better able to attend to my hospital studies. At this period I made one valuable addition to my professional acquaintance, Nicolson, who is still living, though in dilapidated health, at Calcutta. He was some years older than myself, was a protégé of Mr. Home, had a house opposite his in Sackville Street, and assisted him in his private practice. He was a man of considerable talents, and an excellent practical surgeon, but with no taste for the science of his profession. Three years afterwards he went to India in the service of the East India Company, where, from the high character which he brought with him, he had at once an office given him which enabled him to reside at the seat of government. He soon obtained a very large and lucrative private practice in Calcutta, besides acquiring a great degree of popularity, to which his kind disposition and open and manly character justly entitled him. . . .

The commencement of my studies at the hospital was that of a completely new era in my life. Hitherto it is true that I had worked hard enough. With the exception of Lawrence, I doubt whether any one of my acquaintance had been equally diligent. But it was rather as a matter of duty, or I rather ought to say of necessity, than because I felt any very great interest in what I was doing; and most willingly, if I could have afforded it, would I have turned my back on anatomy and returned to literary pursuits. A great change took place as soon as I became familiar with the business of the hospital.

To those who really desire to learn, the wards of a hospital are soon found to be replete with interest. At first all is confusion. The nice distinction of symptoms on which the diagnosis of disease depends, why the pulse in one case indicates immediate danger, and in another none at all, why one patient recovers and another dies, why the same kind of treatment is successful in one instance and fails in another; these, and a multitude of other matters, are quite inexplicable to the young student. Everything is seen as it were through a mist. After no long time, however, the mist begins to clear away, and whoever has advanced thus far finds no difficulty afterwards. Every case is an interesting subject of enquiry. A great game is being played in which the stake is often neither more nor less than the life or death of a fellow-creature, and in which those among the students who devote themselves to their business perform a humble yet not unimportant part without any painful feeling of responsibility. Not many months elapsed before I became sensible of the good effect of these new studies, and of the wisdom of Dr. Baillie's advice that I should make myself a tolerably complete anatomist before I commenced my attendance at the hospital; as I found that I was able to comprehend many things that were passing under my observation which I could never have properly comprehended otherwise, and in which those who were less prepared in this respect were little able to understand.

During the summer of 1803 I never failed to pass the early part of the day in the wards of the hospital. In the afternoon I usually dined by myself at my lodgings in Knightsbridge, and in the evening read some Latin classics, and other books which formed my scanty library, or a novel from a small circulating library at Brompton, or walked in Kensington Gardens. As the season advanced, most of my friends left London. A few, however, remained, whom I met occasionally; among them was Dibdin, since known by his works on Bibliography, who at that time resided at Kensington, not very far from my lodgings at Knightsbridge, and with whom I occasionally wandered to hear the nightingales in the lane beyond Holland House. In September I returned to my father's house at Winterslow, intending to remain there only for a short time, and to be in London again when the lectures in Windmill Street were resumed on the first of October. I had not, however, been long in the country before I had an attack of fever, which confined me for some time to my bed. On my recovery, my father took me to the sea-side at Mudeford, in Hampshire, from whence I returned to

London at the end of October. This was the last opportunity I had of seeing my father. He drove me in his phaeton to Lymington, where I found the mail-coach which conveyed me to Southampton. On the following morning I embarked in one of the long stage-coaches then in use (like a modern omnibus), which conveyed me to London. It was a melancholy journey. My father's health was visibly failing; though as far as my bodily powers were concerned I had pretty well recovered from the effects of my illness, my animal spirits were at a very low ebb. I had never before, and have never since then, been in so desponding a state of mind; and I shall never forget the feelings which oppressed me as I passed through the romantic scenery of the New Forest, or as I sate on the following day, with eleven other passengers, in the slow-going long coach. It seemed as if I was not equal to the climbing the mountain which lay before me; yet I was sensible that I had no alternative, and that I must either climb it or starve. This state of mind, however, was not of long duration: I was soon hard at work, and forgot my anxieties.

I now removed to some lodgings in May Fair, which being situated between Hyde Park Corner and Great Windmill Street, enabled me more easily to divide my studies between the hospital and the school of anatomy. At the latter I had obtained some credit with Mr. Wilson and his colleague Mr. Thomas. The latter only delivered a few of the anatomical lectures, but it was understood that he was to superintend the dissections, and give an anatomical demonstration for an hour daily in the dissecting-room. He was not very fond of his vocation as a teacher, and as he was acquiring a considerable share of private practice, he was led to play truant a good deal. When he did so, he was accustomed to ask me to give the demonstration in his place; an arrangement which was attended with no difficulty, as both Mr. Wilson and the students were, or seemed to be, well satisfied with it, and as I felt myself sufficiently rewarded for the trouble which it gave me by the position in which it placed me above that of the ordinary students.

During this winter (1803–1804) I still continued to attend the meetings of the Academical Society, and kept up my intercourse with my former friends about the Inns of Court. By great prudence I continued to live with sufficient comfort without making more than a very moderate demand on my father's limited means, and was never once in debt. I felt, however, that it would be very convenient to me indeed to have a little more money at my disposal. Some of my friends at this time obtained some additions to their incomes by writing for magazines and other publications. Ellis especially in great measure maintained himself in that way, and it came into my mind that I might follow his example. I offered a disquisition on the study of metaphysics to Richard Phillips, who published the 'Monthly Magazine' (and who was afterwards Sir Richard Phillips, and himself the author of a crazy work on Natural Philosophy). Phillips declined to accept it, in which he was quite right, as it was a very absurd production. He did not, however, altogether decline my services. One of his speculations was the publication of a book under the name of 'The Annual Biography,' and knowing that I had lived in Wiltshire he proposed that I should write the life of Beckford of Fonthill, the author of 'Vathek.' As I knew nothing of this individual except some general reports, of which the less was said the better, I declined the proposal. I then offered some papers on literary subjects to Baldwin's 'Literary Journal,' a magazine which has been long since extinct. These were trumpery enough ; nevertheless they were favourably received, and my vanity was soon gratified by seeing myself for the first time in print. The editor wrote to me that he was in my debt, and that I might receive a small sum that was owing to me whenever I could go to New Bridge Street for the purpose. I know not how it was that I never applied for the money. I found that I could not well follow two trades at the same time, and thus my literary adventures soon came to an end.

I have mentioned that when I parted with my father in the previous autumn his health was a good deal failing. It continued to fail through the winter, but he was so anxious not to interfere with the studies of my elder brother and myself that he would not allow us to be informed of it. In March an alteration for the worse took place rather suddenly ; and before we were aware that his life was in any real danger he was no more. I had never before known what it was to lose any one for whom I had much affection, and I felt the loss most acutely. It dwelt on my mind long afterwards, and I well remember that for some months he was continually present to me in my dreams. My uncle, Charles Collins, who was an unmarried man, invited our whole family to his house at Salisbury, where we remained until after the funeral. I then returned to London forlorn enough, but less so than I should have been if I had not found much kindness and sympathy among some of my relations, especially Dr. and Mrs. Denman, Lady Staunton, and my cousins Mrs. Baillie and the present Sir George Staunton. The latter was two years older than myself, had been my playfellow when we were boys, and has continued my intimate friend, without our friendship having been interrupted for one instant, even to the present day. He was at this time a writer in the East India Company's factory at Canton, but was in England on leave of absence, and living with his mother.*

I must avail myself of this last opportunity of saying a few words more respecting my father. I have already expressed how great our obligations are to him for the pains which he took with the education of my brothers and myself. It is still a matter of surprise with me that he should by himself have been able to do so much for us in the way of instruction as he did. But I owe him much more for the example which he set us as a man of the most strict integrity and honour, with an almost chivalrous notion of independence. He taught us to trust to nothing but our own character and conduct; and to disdain the attaining advantages by any other means. In early life, having lived much with Lord Holland and his friends, he had been what was then called a *Foxite*, and he continued to be a Liberal in politics to the last. This, in a worldly point of view, was much to his disadvantage, as for many years before he died, a violent party spirit prevailed, and the Tory party were predominant. He was a Liberal in other matters also, having no kind of horror of dissenters. He was a sincerely religious person, but he made no parade of his religion. He made us read Butler's 'Analogy,' and Paley's 'Evidences,' but never discussed such abstruse points in theology as those which agitate men's minds in the present contentious age. His great fault, and, indeed, the only one of which I have any recollection, was a hasty and impetuous temper; but this was combined with great tenderness and kindness of disposition. If he was sometimes wanting in that degree of patience which is essential in a tutor having to deal with his pupils, whose wits are not equally bright on all occasions, his affection for us was unvarying. He was always anxious to promote our innocent recreations, and I have no doubt that the great object of his ambition was to qualify us to become happy and useful members of society in after life.

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* Sir George Staunton died in 1859, aged 79, issueless, having sat in Parliament from 1818 to 1852.—C. H.

Some time after the loss of my father my mother removed from Winterslow to a house in the immediate neighbourhood of Salisbury. The situation was convenient to her, as it brought her near to my grandmother and my uncle Charles Collins. Her income was very limited, being reduced still further by an income-tax of ten per cent.; and being, moreover, rendered less efficient than it would have been at the present day in consequence of the high prices, not only of provisions, but of all other commodities. The dearness of things depended partly on the great demand occasioned by the expensive war in which the country was engaged, partly on increased taxation, partly on the depreciation of bank-notes under Mr. Pitt's Bank Restriction Act. The possessors of real property were flourishing; the income of professional persons kept pace with the times; and the proprietors of Bank of England stock shared large profits at the expense of the community in the shape of frequent *bonuses*; but persons of fixed incomes were sadly straitened, and my mother was one of them. She was, however, an excellent manager, prudent, careful, and as free from selfishness as it is possible for any one to be. She at once determined that she would do her best to maintain my brother and myself in the course on which we had entered, and partly out of her income, and partly by not hesitating to sink a portion of her capital, she was enabled to do so. Of course this could not have been accomplished, as far as my elder brother and myself were concerned, if we ourselves had not partaken of her care and prudence. By avoiding all extravagancies we continued to live with as much comfort, and to keep up as respectable an appearance as many of our associates whose means were larger than our own, and who indeed were not unfrequently in difficulties which we were able to avoid.*

During the summer of 1804, a friend of mine, of the name of Jeffreys, was house-surgeon of the hospital, and my intimacy with him enabled me to pursue my studies there with great advantage. He had more knowledge of his profession than most young men of his standing. In the early part of the day, I was always with him in the wards; and in the evening, we were generally together. It was from him that I first learned the importance of keeping written notes of cases, a practice which I continued ever afterwards. These notes I have carefully preserved. They now form many thick quarto volumes of manuscripts, to which (and even to the earliest of them) I not unfrequently refer with advantage, even at this advanced period of my professional life.† My custom has been to take short notes at the bedside of the patients in the day, and to expand them, with the aid of my memory, in the evening. Thus they became an exercise of the memory, and, instead of weakening, tended to strengthen that important faculty. After an experience of nearly fifty years, I am satisfied that no one can be well acquainted with his profession, either as a physician or surgeon, who has not studied it in that manner. It is only by these means that a case can be thoroughly and scientifically investigated, or that that minute and accurate knowledge of it can be obtained which is necessary to a right diagnosis. For one who is to occupy hereafter the situation of a consulting practitioner, to whom younger or less experienced persons will apply for assistance in cases of doubt or difficulty, it answers another purpose, as it enables him to express himself with greater facility, and especially to give written opinions with a degree of clearness and precision with which he could not give them otherwise. I have always, during the many years in which I was a teacher, and a hospital-surgeon, endeavoured to impress on the minds of my pupils the necessity of making and preserving such written records of their experience; and I have often been pained to observe how small a proportion have followed the advice which I gave them. Some of them find a difficulty in doing so from the want of original education, and really not having a sufficient knowledge of the use of language even for this simple kind of literary composition; others neglect it from mere idleness; while the great mass of students, whose period of professional education is limited, are so occupied by the great (and, as I think, unnecessary) number of lectures which they are now required to attend, and in running from one class-room to another, that they really have neither the leisure nor the physical powers necessary for pursuing, in any efficient manner, the practical study of disease in the wards of the hospital.*

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* Mrs. Brodie died in 1847, aged ninety-two.—C. H.

† During the winter previous to his death these volumes were read over to Sir Benjamin Brodie by Dr. Reginald Thompson, and he dictated (alas! from the state of his eyesight not being able to read or write) many observations on their contents, which were transcribed by Dr. Thompson, and will be found at the end of this work.—C. H.

* Sir Benjamin Brodie gave an annual prize, to be competed for by the

Although I had now become much interested in my hospital studies, I passed a great part of my time during the following winter (1804–1805) in the Anatomical School, where, in consequence of Mr. Thomas having become still more occupied with his private practice, I had almost the exclusive superintendence of the dissecting-room, under Mr. Wilson, who generally appeared there for a very short time in the forenoon. Mr. Home had made an arrangement by which I was to become house-surgeon of the hospital in the following Midsummer, this being then, as it now is, an office held during twelve months by one of the better-informed students. At the end of the anatomical session, however, a circumstance occurred, the effect of which was to disturb this arrangement. Mr. Thomas determined to retire from his office as a teacher of anatomy, and Mr. Wilson proposed to me that I should succeed him as the demonstrator in the School. . . . .

[*A portion of the MS. is wanting.**]

. . . . . they agreed that I should supply his place, with the understanding that I should be at liberty to vacate the office in the latter part of the autumn, as soon as I found that my duty as a teacher of anatomy rendered it necessary for me to do so. This was a very fortunate circumstance, as my residence in the hospital, even for six months, enabled me to obtain a great deal

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pupils of St. George's Hospital, for the pupil who in the past year had recorded, accompanied with notes, the largest number of cases of patients treated in the hospital. This prize is continued by the present Sir Benjamin Brodie.—C. H.

* The omission is unimportant, probably consisting of a paragraph stating that Mr. Jeffreys was about to vacate the office of house-surgeon, and that Sir B. Brodie was to be appointed in his place—which was the case. He held that office from May to November, 1805, when he resigned it to undertake the duties of teacher of anatomy in the Windmill Street School.—C. H.

of knowledge as to the details of surgical practice which it would have cost me a great deal of trouble to obtain otherwise.

I must not pass over this part of my life without noticing a very great advantage which I possessed during the period of my professional education, compared with what I should have had if I had lived in these later times. No rules were then laid down as to the number of lectures which I was required to attend. The examination at the College of Surgeons was sufficiently good, as far as it went, but it was of a very simple and elementary kind. It was no more than a diligent student might pass without any special preparation for the purpose. The consequence was, that I was enabled to take my education very much upon myself; and I soon found that I could nohow obtain so much useful knowledge as by a diligent attendance on the dissecting-room, and on the wards of the hospital. I cannot say that I neglected the use of books, but it was more in the way of reference and illustration than by a regular course of reading. I attended lectures on Anatomy, and, during one season, Dr. Crichton's lectures on the Practice of Physic, Materia Medica, and Chemistry, the latter especially with some advantage. During my first season in London, I had entered as a pupil to Mr. Abernethy's lectures on Surgery; but having at that time seen no surgical practice, I did not understand them, and soon ceased to attend them. I afterwards entered to some other lectures on Surgery, at the West-end of the town, but found that I learned nothing from them, so I ceased to attend there also. Mr. Home was accustomed to give an annual course of twelve surgical lectures gratuitously to the pupils of the hospital. These were excellent, and I attended them, year after year, with great advantage. Altogether, I do not suppose that I attended one-fourth of the number of lectures which the unfortunate students are now required to listen to under the direction of the constituted authorities. But I was acquiring knowledge in other ways, and much more substantial knowledge than can be acquired from such dull and hum-drum discourses as lectures usually are ; and, which is better still, I had leisure to make my own observations, to think and reflect. Nor was this style of education peculiar to myself. I remember when Mr. Abernethy complained that Lawrence would not attend lectures. My friends and contemporaries, Jeffreys and Lawrence, took the same course ; and so it had been with Nicolson, who was some few years in advance of us. I can easily conceive that, if I had been compelled to sit on the benches of a theatre four or five hours daily, or tempted to compete for prizes as students are, and to get crammed for various examinations, my position in life afterwards would have been very different from what it has been in reality.

It so happened that when I was about to give up my office as house-surgeon to the hospital, Nicolson, whom I have just mentioned, being engaged to be married, and finding that some few years might probably elapse before he could conveniently do so if he waited for practice in London, determined to seek his fortune elsewhere, and accepted an appointment in the service of the East India Company in Bengal, and that Mr. Home proposed to me that I should supply his place by assisting him in his private operations. I conclude that he thought that I should answer his purpose in this respect, but I know that he was partly led to do so by the circumstance of my having made myself a pretty good anatomist, and by the wish to have my help in carrying out the enquiries in comparative anatomy in which he was generally engaged. As these occupations were quite compatible with those which I had in the Windmill Street School, I was very glad to undertake them. They afforded me the means of learning much as to my profession which cannot be well learned in a hospital; and further, by initiating me in the study of anatomy and physiology generally, without limiting my views merely to that which is required for surgical practice, they led me to scientific enquiries which for many years afterwards formed a most agreeable addition to the drudgery of my every-day duties. My connection with Mr. Home also made some addition to my income, as I saw those of his patients who were disposed to have the advice of so young a man as I was while he was in the country for three weeks in September, and as I also received a few fees on some other occasions. My gains, however, in this way were very small; Mr. Home never had a very large practice, such as at all corresponded to his reputation. One year, and that was before I knew him, he had received about 6,700*l.* in fees. This was much less than what Mr. Cline, or Sir Astley Cooper, or myself have received since; but his income while I knew him never, I imagine, amounted to 5,000*l.*, and as he had a large family and lived expensively he had nothing to spare out of it for others. Still, what I gained from that source and from teaching anatomy enabled me to make a somewhat smaller demand on my mother's slender means; and as I always looked to the future and not to the present results of my exertions, I was quite contented.

For nearly two years and a half after I had ceased to reside at the hospital as house-surgeon there was little change in my pursuits or mode of life. During the greater part of that time I lived in lodgings in Sackville Street. The winter months supplied me with a good deal of occupation in the dissecting-room; and whatever time I could spare from my duties as a teacher of anatomy was well devoted to the hospital. I assisted Mr. Home in his private operations and on some other occasions, and to a still greater extent in his researches in comparative anatomy. In this latter employment I was associated a good deal with Mr. Clift, the conservator of the museum of the College of Surgeons. I ought not to mention Mr. Clift's name without expressing not only how much I am indebted to him for the information which he afforded me on the subjects with which he was conversant, but also the great esteem which I have always had for his general character. His history, as I have heard it related by those who were acquainted with it, was nearly as follows:—Mr. Hunter was acquainted with Mrs. Gilbert, a lady of fortune in Cornwall. In conversation with her he observed that he had great difficulty in obtaining fit persons to assist him in making his anatomical museum, and that he believed that his best way would be himself to educate a lad especially for this purpose. Mrs. Gilbert said that she knew a very clever boy who was accustomed to come into her kitchen in Cornwall and make drawings with chalk on the floor, who would with proper instruction become an excellent draughtsman, and who, from the ability which he displayed, would probably answer his purpose very well in other matters; and she offered to negotiate with the boy and his parents for him to come to London on trial. Mr. Hunter gladly availed himself of this offer, and the negotiation ended in Clift becoming an inmate in Hunter's house. I do not know the exact date, but

I believe that this was not more than two or three years before Hunter's death. On the occurrence of this event, Hunter's executors (Dr. Baillie and Mr. Home) engaged Clift to take charge of the museum until they had found the means of disposing of it for the benefit of his family; and when it was purchased by Parliament, and consigned to the care of the College of Surgeons, the council of the college retained him for the same purpose, under the name of conservator, a situation which he retained during the remainder of his life.

Clift's early education had probably not extended beyond reading and writing, but he had a vast desire of acquiring knowledge; had read a great deal in an irregular manner; but his chief study was that of the museum in which he lived for many years; and with this he had a more intimate acquaintance than any other person after the death of the great philosopher by whom it was founded. He had great sagacity, great powers of observation, and great memory, but he wanted that method which a better early education would have afforded him; and his knowledge, though extensive, was of a very desultory kind. His devotion to the memory of Hunter, and his attachment to the museum, formed a remarkable feature of his character, at the same time that his simplicity of mind, his disinterestedness, and the kindness of his disposition, gained him the affection of all who knew him.

It was during the period of which I am now speaking, and not very long after I had ceased to be house-surgeon, that Mr. Home introduced me to Sir Joseph Banks. Sir Joseph took much interest in any one who was in any way engaged in the pursuit of science, and as I suppose partly from Home's recommendation and partly from knowing that I was occupied with him in making dissections in comparative anatomy, was led to show me much kindness and attention, such as it was very agreeable for so young a man to receive from so distinguished a person. He invited me to the meetings which were held in his library on the Sunday evenings which intervened between the meetings of the Royal Society. These meetings were of a very different kind from those larger assemblies which were held three or four times in the season by the Duke of Sussex, the Marquis of Northampton, and Lord Rosse, and they were much more useful. There was no crowding together of noblemen and philosophers, and would-be philosophers, nor any kind of magnificent display. The visitors consisted of those who were already distinguished by their scientific reputation, of some younger men who, like myself, were following these greater persons at a humble distance, of a few individuals of high station who, though not working men themselves, were regarded by Sir Joseph as patrons of science, of such foreigners of distinction as during the war were to be found in London, and of very few besides. Everything was conducted in the plainest manner. Tea was handed round to the company, and there were no other refreshments. But here were to be seen the elder Herschel, Davy, Wollaston, Young, Hatchett, Wilkins the Sanscrit scholar, Marsden, Major Rennell, Henry Cavendish, Home, Barrow, Maskelyne, Blagden, Abernethy, Carlisle, and others who have long since passed away, but whose reputation still remains, and gives a character to the age in which they lived.

In the course of the first few years which elapsed after my introduction to Sir Joseph Banks, I derived so much advantage from the society which I met in his library, and occasionally at his dinner-table, that I feel it in some measure a duty not to omit some further notice of this eminent individual. I have been informed by those who might be supposed to be well acquainted with his history, that as a boy at Eton he was a very indifferent student of Greek and Latin, and that he was himself mortified to find how much less a proficient he was in the school exercises than his fellow-pupils. But even at this early period he began the study of plants; examining the different parts of their structure, and laying the foundation of that extensive knowledge for which he was afterwards distinguished in this department of natural history. Having inherited a considerable fortune, he had no taste for the usual trifling pursuits of affluent young men, and being of an enterprising disposition, he obtained permission to accompany Captain Cook in one (I believe the first) of his voyages of discovery in the Pacific Ocean. I do not know how soon it was after his return to England that he was elected President of the Royal Society, superseding the former President, Sir John Pringle. His election took place after a severe contest, in which his principal opponents were the mathematicians, with Dr. Horsley, the Bishop of Rochester, at their head. He was created a Baronet, a Civil Knight of the Bath (corresponding to the G.C.B. of the present time), and a Privy Councillor. He was annually re-elected to the presidential chair for many years, resigning the office as soon as he found that his declining health prevented his attending the meetings, that being not long before he died.*

His London residence was in Soho Square, there being extensive premises behind his dwelling-house, which contained his library and his botanical collection. The former consisted chiefly of books on Natural History and the transactions of learned societies, and was probably in these departments unrivalled in the world. His principal librarian was a Swede, Dr. Dryander; and under his superintendence the library was so well managed, that although books were lent to men of science in the most liberal manner, I believe that not a volume was ever lost. Dryander was indeed a pattern as a librarian. The library over which he presided was to him *all in all.* Without being a man of science himself, he knew every book, and the contents of every book in it. If any one enquired of him where he might look for information on any particular subject, he would go first to one shelf, then to another, and return with a bundle of books under his arm containing the information which was desired.

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* Sir Joseph Banks was President of the Royal Society from 1778 to 1820. He was born in 1743, and died in 1820, issueless.—C. H.

Besides Dryander, there were two others who acted as sub-librarians, and Dr. Brown, the botanist, who had the charge of the botanical collection. Brown had formerly been engaged as naturalist in Capt. Flinders's expedition of discovery. At the time of which I am speaking, he might be seen daily in Sir Joseph's library, dissecting plants, and accumulating those stores of knowledge which have since gained for him the reputation of being the first botanist and botanical physiologist in the world, and the honour of being one of the very limited number of foreign associates of the Academy of Sciences of Paris. By his will Sir Joseph directed that Brown should receive an annuity during his life, on condition of his taking charge of his library, which was still to be accessible to men of science as heretofore. He further directed that after Brown's death the library should be transferred to the British Museum. It being, however, found that a more convenient arrangement might be made both for Brown and for the public, the trustees of the museum appointed Brown keeper of the botany in that institution, and the library was at once transferred to its ultimate destination.

The attention which Sir Joseph Banks paid to the affairs of the Royal Society was unremitting. He was very much of an autocrat, but, like other successful autocrats, he maintained his authority by consulting the feelings and opinions of others, and no one complained of it. There is no doubt that his ample fortune, and his devotion of it to purposes of natural science, made his task more easy than it would have been otherwise; still, he could not have accomplished what he did if he had not possessed a great knowledge of human nature. It was by a combination of these means that he was enabled to exercise his influence over the philosophers, so that every one among them looked up to him as a friend and counsellor; and that he succeeded in keeping in abeyance among them those feelings of jealousy from which even those who, standing apart from mere vulgar pursuits, devote themselves to the acquisition of knowledge, are not altogether exempt.

During the greater part of the summer, Sir Joseph resided at his house in Lincolnshire, where he occupied himself chiefly with agricultural pursuits, and in presiding over agricultural meetings. In November he returned to his house in Soho Square, in time to be present at the first meeting of the Royal Society. During the winter, besides the weekly evening meetings in his library, he was in the habit of entertaining parties of scientific men at dinner. Every morning he had a sort of public breakfast in his library, at which foreigners of distinction and others were introduced to him. As the spring advanced he left his house in London to reside at a villa known as 'Spring Grove,' near Hounslow, where he remained until the session of the Royal Society terminated. Here he dined daily at four o'clock, in order that his frequent visitors from London might have ample time to return home in the evening. When the weather permitted, his guests adjourned to have tea and coffee under the cedars in the garden. In the intermediate time it was not unusual to visit his hot-houses and conservatories, under the auspices of his unmarried sister, Miss Banks ; or the dairy, which was under the especial care of Lady Banks, who was proud of displaying a magnificent collection of old china-ware which was there deposited. These parties at Spring Grove were not the less agreeable because they generally consisted of few persons, and everything was conducted in a simple and unostentatious manner.

On the whole it is difficult to conceive that any one could perform his duties as president of the Royal Society in a manner more honourable to himself, or more beneficial to the community, than that in which they were performed by Sir Joseph Banks. It is to be observed at the same time that he had some peculiar advantages, having an ample fortune and no family, and having also the good taste to avoid being involved in political discussions and disputes.

In March 1808, through the interest of Mr. Home, with the assistance of his colleague, and of some little reputation which I had myself acquired as a young teacher of anatomy, I was elected as assistant surgeon to St. George's Hospital. I was fortunate in obtaining such an appointment so early in life. I was indeed not quite twenty-five years of age (my birth-day being in June). I was at that time living in lodgings at No. 24 Sackville-street, not having my name on the door as a candidate for private practice, and being still one of the senior students at the hospital. From the date of my appointment Mr. Home left me very much of the management of his patients, and by degrees interfered in it very little himself. This, however, was not the only advantage which I derived from my new office. The junior surgeon, Mr. Gunning,* joined Lord Wellington's army in the Peninsula, being attached to the staff of the commander-in-chief as surgeon-in-chief of the British forces. There was an old law of the hospital (now abrogated) which enabled the Weekly Board to give an unlimited leave of absence to any one of the medical officers who was employed on military service. This leave was granted to Mr. Gunning. The governors at the same time appointed the other assistant-surgeon, Mr. Robert Keate, and myself to take charge of his patients in his absence. This arrangement continued until the year 1813, when, on the resignation of Mr. Thomas Keate, his nephew was elected surgeon in his place; and from that time until Mr. Gunning resumed his duties, about four years afterwards, his patients were entirely under my management. Thus I had the opportunity, at an unusually early age of acquiring a large experience in hospital practice, and to this circumstance my early professional success may very much be attributed. Having at this time no private practice, I was able to devote a great deal of my time to my duties in the hospital. During six months in the year I passed several hours daily in the wards, taking notes of cases, and communicating freely with the students. During the other six months, the whole of the time which I could spare from my employment as a teacher of anatomy was devoted to the hospital also. The custom at St. George's, and indeed at all the other metropolitan hospitals, had hitherto been for the surgeons to go round the wards only on two days in the week, not attending otherwise, except when there were operations to perform, or severe accidents which made their assistance necessary, or on other special occasions. Mr. Robert Keate and myself were the first persons who adopted another mode of proceeding. We were at our posts in the hospital daily, and superintended everything; and there was never an urgent case which we did not visit in the evening, and not unfrequently at an early hour in the morning also. This was of as much advantage to the students as it was to the patients and ourselves, and the effect of it was soon perceptible, in the increase of zeal and diligence on their part, and in their increasing numbers. After some time I appointed clinical clerks, one for the patients of Mr. Home (or, as he became soon afterwards, Sir Everard Home) and another for those who were under my care as officiating for Mr. Gunning. I also began to deliver clinical lectures; and I believe that these were the first lectures of this kind which were ever delivered in a London hospital.

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* Mr. Gunning, who died in Paris in 1863, in his 90th year, was surgeon to St. George's Hospital from 1800 to 1823.—C. H.

I may take this opportunity of saying a few words respecting my friend and colleague Mr. Robert Keate. At the time of which I am speaking his uncle held the very high and important office of surgeon-general to the army, and he himself was a deputy-inspector of military hospitals, and assisted his uncle in his official duties. He had been introduced by his uncle to the royal family, with whom he was a considerable favourite; was surgeon to the queen, and to some of the royal dukes and princesses. These various avocations for a considerable time had interfered with his devoting himself so much to the business of the hospital as he would have done otherwise; nevertheless he had already obtained a very considerable practical knowledge of his profession, and was an excellent operator. We acted together as colleagues until I resigned my office as surgeon in the year 1840; and it is, I hope, to the credit of both of us that, during the whole of those thirty-two years, the most perfect harmony and friendship always subsisted between us. We had the most implicit confidence in each other; and not only did we never openly disagree, but I do not believe that either of us entertained even unkind thoughts as to the other. He was, and still is, a perfect gentleman in every sense of the word; kind in his feelings; open, honest, and upright in his conduct. His professional knowledge and his general character made him a most useful officer of the hospital: and, now that our *game has been played*, it is with great satisfaction that I look back to the long and disinterested friendship that existed between us.*

For a year or two before I was elected assistant-surgeon at the hospital, Mr. Wilson had been anxious that I should join with him in delivering lectures on surgery, in the theatre in Great Windmill Street, in addition to those delivered by him on anatomy. I had, however, declined to do so, not feeling that either from my knowledge or my position I was equal to the task. On my becoming connected with the hospital, however, the case was altered. I could now refer to my own experience and my own practice, and I had a place in my profession which I had not previously. The consequence was that in the October of 1808 Mr. Wilson and myself began a course of surgical lectures. Mr. Wilson delivered in each course about a dozen lectures, the remainder, and of course the much greater number, being delivered by myself. After the second year Mr. Wilson retired from the surgical lectures altogether, and from that time the whole of these lectures were given by myself, until I resigned them to Mr. Babington and Mr. Hawkins nearly twenty years afterwards. My lectures were very well attended, not only by the students of our own anatomical school, but also by those of Mr. Brookes' anatomical school in Blenheim Street. My stock of knowledge at first must necessarily have been very limited, and for many years my delivery was constrained and awkward. Nevertheless my lectures were very popular. The explanation of this I apprehend to be that whatever information I gave was drawn from or confirmed by my own observation, and not taken from books, and that I was really in earnest in my endeavours to instruct my pupils. I took great pains in the composition of my lectures, referring to and analysing my manuscript notes of cases, and comparing the results at which I had arrived with those recorded by the last surgical writers. At first I wrote out about half a dozen lectures at full length. But I soon found that it was needless, and almost impossible, to pursue this plan as to the entire course, and I therefore contented myself with making pretty full notes, and then abridging them to take with me into the theatre.

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* Mr. Robert Keate continued as surgeon to St. George's Hospital until 1853. He died in 1857, in his eighty-first year. He was three times elected President of the Royal College of Surgeons. He was Serjeant-Surgeon to their majesties William IV. and the present Queen. He was also surgeon to the King of Hanover, the King of the Belgians, and their royal highnesses the Dukes of Cambridge and Gloucester.—C. H.

Soon after I had begun to deliver surgical lectures, Mr. Wilson, who had now obtained a considerable share of private practice, proposed that I should give a part of each anatomical course also. This necessarily imposed on me a considerable addition to my labours. At nine or ten o'clock in the evening, after my day's work was concluded, I had to arrange my lectures for the following day, and this frequently occupied me until three or four o'clock on the following morning. On the days on which I had no evening lecture, having a pretty large acquaintance, I was very much engaged in dinner society, which, however, I never allowed to interfere with my more serious occupation, being of temperate habits, and always returning home at an early hour.

Besides my business at the hospital, the composition and delivery of my lectures, and the superintendence of the dissecting-room, I assisted Mr. Home in his operations in private practice, visited some of his patients when unforeseen circumstances occurred, and he was out of the way, and made some dissections with him and Mr. Clift in comparative anatomy. Thus, although I had nothing that deserved the name of private practice, my life was one of great occupation. I had, however, although not of a robust constitution, considerable powers of enduring fatigue. My health was sufficiently good, and my prospects of advancement in my profession were as good as possible; and I have no doubt that the cheerful spirits which these gave me enabled me to accomplish easily what it would have been difficult for me to accomplish otherwise.

It was somewhere about this time that Dr. Bateman proposed to me to join Dr. Henderson and himself in the publication of a periodical medical work, under the title of the 'Medical Annual Register,' which was to consist partly of reviews of medical books, partly of miscellaneous intelligence connected with the medical sciences. I declined taking any active part in the management of it, but promised to contribute some articles, at the same time suggesting that they should apply to Lawrence for his assistance also. The work was not very popular, and after the appearance of a second volume, died a natural death. My own contributions were only to the first volume, and if my recollection be accurate, were only three in number; namely, a review of Dr. Hooper's 'Anatomist's *Vade Mecum*,' of Cooper's 'Surgical Dictionary,' and another of 'A Treatise on Lithotomy,' by an Edinburgh surgeon of the name of Allan. The truth is, that with the exception of Dr. Bateman, who was older and more experienced than the rest of us, there was no one among us who had sufficient practical knowledge to be qualified to do justice to such an undertaking, and I have looked back at it ever since as a very foolish concern, in which it would have been much wiser for me never to have interfered. I need scarcely add that I have never repeated the mistake, or written another medical review, unless an article on homœopathy and other quackeries, published in the 'Quarterly Review' for December 1842, deserves that appellation.

Hitherto I had lived in lodgings at No. 24, in Sackville Street, with very indifferent accommodation, for which, however, I paid 100*l.* per annum; but in the autumn of 1809 I took a house at No. 22, in the same street, my mother having advanced me the money required for the purchase of the lease, and furnishing it. Now, for the first time, I placed my name on the door, and began to think seriously of private practice. I was able to accommodate three private pupils in my new residence, and this made an addition to my income sufficient to make up the difference between my expenses as a lodger and as a housekeeper. In the following year, in addition to a somewhat increasing income from my surgical lectures, I obtained between 200*l.* and 300*l.* from my private practice. Thus, in one way or another, I became much at ease as to my pecuniary circumstances, without having occasion to make any further demands on my mother. I was never once in debt, had always some money in hand, and being thus free from any great anxiety, I was able, in the spring of 1810, to engage with some considerable interest in some physiological enquiries on my own account, having been led to do so chiefly by the perusal of those very remarkable books, for which we are indebted to the genius of Bichat. I had previously communicated a paper to the Royal Society, which I now hold to be of little, or rather of no value. The council, however, thought it worthy of being printed in the Philosophical Transactions. On the strength of it, Sir Joseph Banks agreed that I should be proposed a Fellow of the Royal Society, and my election took place without opposition.* During the winter of 1810 and 1811 I communicated to the Society two physiological papers; one, 'On the Influence of the Brain on the Action of the Heart, and the Generation of Animal Heat,' and the other, 'On the Effects produced by certain Vegetable Poisons.' The former of these was given as the Croonian Lecture in November 1810. They made a favourable impression at the time, so much so, that the Council awarded me the Copley medal in the autumn of 1811. At this time I was only twenty-eight years of age. I was told that when the question as to my having the medal was discussed in the Council, the only objection made to it was by one of the Councillors, who observed that it had never before been given to so young a man; on which Dr. Wollaston observed, that he thought if I deserved the medal, that was only an additional reason for my having it. Few events that have occurred to me have gratified me so much as this.* This was, on the whole, a very happy period of my life. The most distinguished Fellows of the Royal Society, whom I was accustomed frequently to meet at Sir Joseph Banks' and elsewhere, treated me with much consideration and kindness, and I obtained a place in my profession which I could not have obtained otherwise. Of course, I was not exempt from those anxieties to which all who depend on their own character and exertions for their support and station in society are liable in the early part of their career. Every case that I was called on to attend was magnified in my estimation as if my future success had been involved in the result. But such anxieties were transitory, and, on the whole, interfered very little with the comfort of my life.

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* On the 15th of February 1810.—C. H.

About this time I became a member of a society which was formed under the name of 'The Animal Chemistry Club,' or 'A Society for the Promotion of Animal Chemistry.' We met at dinner alternately at the houses of Mr. Home and Mr. Hatchett, once in three months, our party consisting of Mr. Home, Mr. Hatchett, Mr. (afterwards Sir Humphrey) Davy, Dr. Babington, Mr. William Brande, Mr. Clift, Mr. Children, Dr. Warren, and myself. They were very rational meetings, in which a good deal of scientific discussion was mixed up with lively and agreeable conversation. The society continued to exist for ten or eleven years, but during the latter part of the time, some other members were added to it, and it degenerated into a mere dinner club. Mr. W. Brande and myself are at present the only surviving members. We were, as young men, living on terms of great intimacy, and our friendship has continued unimpaired down to the present time.

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* A medal was awarded to the present Sir Benjamin Brodie, Professor of Chemistry in the University of Oxford, by the Royal Society, in 1850, for his investigations 'On the Chemical Nature of Wax.' With the exception of Sir William Herschel and his son Sir John Herschel, this is the only case in which father and son have received the like honour.—C. H.

Mr. W. Brande was the younger son of Mr. Brande, who had accompanied Queen Charlotte from Germany to England, and was apothecary to the King and Queen and the Royal Household while in London. He had, as a boy, attracted the notice of Mr. Hatchett, and from him had acquired a taste for chemical pursuits. He delivered lectures on chemistry, in connection with Mr. Wilson's Anatomical School in Great Windmill Street; and was, even at this early period, an excellent lecturer, distinguished for the clearness and method of his discourses, and for the admirable manner in which he performed the experimental part of his instruction. When Sir Humphrey Davy, after his marriage with Mrs. Apreece, resigned the Professorship of Chemistry at the Royal Institution, Brande was appointed as his successor, and he continued to hold this office between thirty and forty years. He also succeeded Davy as one of the secretaries of the Royal Society, which office he held for many years, being succeeded by Mr. Children. In the early part of his career he entered on some original investigations in chemistry, and pursued them with much success. His friends have much regretted that he did not continue to distinguish himself in this manner afterwards. It is, however, easy to be explained. He married Mr. Hatchett's youngest daughter. He had a large family, and had abundance of occupation in his endeavours to obtain the income which, in his condition of life, was necessary to maintain them. He held an office, which he holds still, in the Royal Mint.

He held another office, as director of the laboratory belonging to the Society of Apothecaries. He delivered an annual course of lectures, as Professor of the Royal Institution, and he also delivered a lecture three mornings in the week, during the winter, in the laboratory of the Institution; forming an extended course of chemistry, which was attended by the medical students of St. George's Hospital, and by many others, and which made a constant exertion necessary to keep him on a level with the increasing knowledge of the day. In fact, his life was one of incessant labour, and he had no leisure for other pursuits. If Davy or Faraday had had large families to provide for, they would not have had sufficient leisure, nor sufficient freedom from anxiety, to distinguish themselves as they have done in the line of original research.

The meetings of the Animal Chemistry Club, while it was limited to its original members, were to me very interesting and instructive. Hatchett, who had now inherited a considerable fortune on the death of his father, had ceased to work in chemistry (in spite of the remonstrance of Sir Joseph Banks, who used to say to him in his rough way that 'he would find being a gentleman of fortune was a confounded bad trade'), but he had previously laid up a large store of knowledge, abounded in the materials of conversation, and was a delightful companion. Davy, who in general society was generally over-anxious to display himself to advantage and thought too much of what others would think of him, with us retained his original simplicity, and was quite at his ease. Whatever was the subject of conversation, he had something to offer and something to suggest, which showed in how remarkable a degree he combined within himself a highly poetical imagination with a strict, cautious, and accurate judgment. Babington, the intimate friend of Davy, to whom he dedicated his 'Salmonia,' with a good deal of scientific knowledge, was full of the most kind and generous feelings, and his conversation was enlivened by appropriate anecdotes, with a fund, I will not say of wit, but of infinite humour. Home, besides his acquirements as a naturalist and comparative anatomist, possessed a knowledge of the world and of human nature which, displaying itself every now and then, and without premeditation, afforded much useful information to younger men; otherwise he was no great master of the art of conversation, or at least not at all to be compared in this respect to either Hatchett or Davy.

I may take this opportunity of mentioning another society to which I at this time belonged. It was founded in the year 1793, by John Hunter and Dr. Fordyce, under the name of a 'Society for the promotion of Medical and Chirurgical Knowledge.' It was originally composed of nine members, with a provision that it might be increased to twelve, but that it should never exceed that number. When they were so kind as to elect me into it, in 1808, Fordyce, John Hunter, and Dr. John Hunter,* three of the original members, had been removed from it by death. The existing members were Dr. Baillie, Mr. Home, Dr. (afterwards Sir Gilbert) Blane, Dr. John Clarke, Dr. Robertson Barclay (a son of Dr. Robertson, the historian), Dr. Wells, Mr. (afterwards Sir Patrick) Macgregor,† Mr. Wilson, Dr. David

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* Dr. John Hunter was no relation of the other Hunters. He had been a physician in the army, and had published a work of much repute on the diseases of the West Indies.

† Sir Patrick Macgregor was an army surgeon of considerable repute. He was surgeon to the Duke of York, and Serjeant-Surgeon to the King; surgeon to the Military Asylum at Chelsea and to the Lock Hospital. He was created a baronet and died in 1828. He was succeeded as Serjeant-Surgeon by Sir Astley Cooper.—C. H.

Pitcairn, and Dr. Lister. The society had already published two volumes, and another was being prepared for publication. We met at dinner once in a month (except during the summer) at Slaughter's coffee-house in St. Martin's Lane. The papers communicated were first read, and then discussed and corrected after dinner. Dr. Wells, who acted as secretary, was the most active member, and took a great deal of trouble even in correcting the literary composition of the papers. The third and last volume of their transactions was published in the year 1812, and contained one short paper of very little value contributed by myself. From this time the society continued to exist merely as a dining club, Dr. Wells having resigned the secretaryship, to which, though it had become little more than a nominal office, I succeeded. The meetings, however, were very regularly attended, and were, to myself at least, very useful and instructive. In the year 1817, Dr. Wells, who had always been a person of delicate health, became affected with a serious illness, which after some months terminated fatally. Not long before his death, he addressed, through me, a letter to the society, which I still possess, proposing, as it was not probable that they would ever publish another volume, that the society should be dissolved. I suspect that he was apprehensive that, if it continued to exist, its future volumes would not maintain the reputation of those which had preceded them. However that might be, the society acted on his suggestion, and on June 2, 1818, the formal dissolution of it took place, it being agreed that the book containing the minutes of their proceedings should remain in my hands.

Dr. Wells was one of the most remarkable persons with whom it has been my lot to be personally acquainted.

He is too well known by his writings, among which his 'Essay on Dew' deserves more especial notice, for it to be worth while for me to speak of him as a philosopher; but I may venture to give some account of him otherwise. He was never married, but lived by himself, with (I believe) only a single maid-servant, in a small house in Serjeant's Inn, Fleet Street. Although he had paid great attention to his profession and had ample opportunities of studying it as physician to St. Thomas's Hospital, he had never more than a very limited practice. For this, indeed, he was in many respects very unfit: having dry and, in general society, ungracious manners, and being apt to take offence where no offence was intended. Yet he had great kindness and warmth of heart mixed up with these less amiable qualities, and while he was greatly respected by those who really knew him, he was even beloved by the very few with whom he was intimate. His autobiography, which is prefixed to the posthumous edition of his works, is very characteristic, and, when I read it, reminded me very much of that of David Hume, to whom, indeed, as to the character of his intellect, he bore a considerable resemblance, however different he may have been from him in some other respects.*

In the course of the year 1812, I communicated to the Royal Society two other papers: one being a continuation of my paper on poisons; the other containing an account of some further experiments illustrating the influence of the nervous system on the production of animal heat. My former paper on this subject had been very incomplete, inasmuch as I had made no examination of the air expired with reference to the consumption of oxygen and the generation of carbonic acid. In my second series of experiments I endeavoured to supply this deficiency. The experiments were made by means of a very simple apparatus which fully answered the intended purpose, and were conducted with the greatest care, the expired air being examined by my friend Brande. Although the conclusions which I had ventured to draw from my first series of experiments were certainly premature, they were fully confirmed by my subsequent observations. They have since been further confirmed by those of Le Gallois, as I have shown in the notes which are appended to the republication of my physiological papers in the year 1850.

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* Dr. Wells was elected a Fellow of the Royal Society in 1793. He was born in 1757, and died in Serjeant's Inn, September 18, 1817.—C. H.

During this time my private practice was slowly increasing at the rate of about 200*l.* or 250*l.* annually. I continued to pursue my physiological investigations, but was chiefly occupied with the business of the hospital: with taking and arranging my notes of cases, and with adding to my lectures on surgery whatever additional information I had acquired.

During the time of my being house-surgeon of the hospital I had the opportunity of examining, by dissection, a case of what has been called 'spontaneous dislocation of the hip,' consequent on disease of that joint. It very much excited my interest at the time, and led me to speculate on the pathological changes which occur in other cases of disease of the joints. I read and studied all the known works on this subject, but obtained from them no satisfactory information. The treatment of these diseases was, at this time, as unscientific as possible. Different surgeons had different nostrums, which they applied as it happened, without any definite rules as to their application. It occurred to me that there was no department of surgery which more required further investigation than this, or which admitted of greater improvement. From the time of my being elected assistant-surgeon to the hospital, I took notes of almost every case of affection of the joints which occurred among my own patients, and of very many of those which were under the care of the other surgeons. Besides the dissections which I obtained in the hospital, my acquaintance with medical men afforded me the opportunity of making many dissections elsewhere. For a long time I arrived at no results. All was confusion. At the end of the first year I seemed to be no wiser than I had been at the beginning ; and at the end of the second I knew little more than at the end of the first. Still I persevered, until at last I perceived some glimmering of light. I had been especially anxious to make the examination of joints in which disease was in its incipient stage. But the opportunities of doing so could present themselves only where patients thus affected had been the victims of other complaints, and were comparatively rare. By constantly looking for them, however, I obtained many such opportunities at last, and then I was enabled to understand many cases of disease in its more advanced stage which I never could have understood otherwise. In the year 1813 I had made sufficient progress in these enquiries to venture to draw up a paper, which I communicated to the Medical and Chirurgical Society under the title of 'Pathological Researches respecting the Diseases of Joints.' This paper was printed in the fifth volume of the 'Medico-Chirurgical Transactions,' and was the foundation of the volume which I published on the same subject some years afterwards. This work has now gone through five editions. In every succeeding edition I have made such alterations and additions as were suggested to me by my increased experience; my object being especially to make it useful to practitioners whose business it is not merely to understand the exact nature of diseases, but also to cure them. I have reason to believe that my labours have not been in vain, and that a great number of limbs are now preserved which would in former times have been amputated as a matter of course. Still I am well aware that much yet remains to be done, and that it cannot be otherwise than that, in the course of time, I must be left behind by those who begin their enquiries where mine have terminated. So, however, it must be in all matters within the range of the physical sciences. Whatever we may learn, there is something to be learned further still, and if this be the case as to chemistry or physiology, much more must it be so as to so difficult a science as pathology, in the pursuit of which we get little or no help from experiments, and have to rely almost wholly on the observation of facts which present themselves as it were incidentally.

In the year 1813 I communicated a paper to the Royal Society 'On the influence of the Nervous System on the action of the Muscles in general, and of the Heart in particular.' It was in the form of the Croonian Lecture, which I had been appointed to deliver by the President.

The doctrine of the schools on these subjects at this time was that of Haller, namely, that the generation of muscular irritability is independent of the nervous system: and that the blood circulating through its cavities is the stimulus on which the contraction of the heart immediately depends. Some doubt had been thrown on the correctness of the last of these opinions by the observations of Le Gallois, who came to the conclusion that the heart derives its force and power of contraction from the spinal chord. It had been shown by Bichat, and the fact had been confirmed by my own experiments, that in warm-blooded animals the heart continues to act so as to maintain the circulation of the venous or dark-coloured blood during a period of two or three minutes after respiration has ceased. In the investigation which formed the subject of the Croonian Lecture I found that the heart, when suddenly and completely emptied of blood, continued to act even for a longer time than when it remained with its cavities distended with dark-coloured blood after the cessation of respiration, the contractions of the different parts of it being as regular, as orderly, and as vigorous as when the circulation is still going on. From this and other circumstances I was led, *first*, to reject the hypothesis of Haller, and to refer the contractions of the heart to the nervous influence supplied by the cardiac plexus of nerves, and not to the stimulus of the blood in its cavities; and *secondly*, to apply the same explanation to the movements of other involuntary muscles. The council of the Royal Society directed that my paper should be printed in the 'Philosophical Transactions.' On further considerations, however, I was led to request that the printing of it should be postponed, as I felt that the subject required further consideration, and it still remains as one of the unpublished papers in the archives of the society. My other avocations have prevented my pursuing these enquiries further. But other physiologists, though not exactly on the same grounds, have arrived at the same conclusions; and the anatomical discovery that the grey matter of the nervous system, in which it is supposed that the nervous influence is generated, exists in combination with the cardiac nerves, sufficiently explains some of the phenomena of which

I was unable to give a satisfactory explanation formerly.*

During the session of 1808–9, and the three following winters, I had continued to deliver a considerable part of the anatomical lectures in conjunction with Mr. Wilson. In the spring of 1812, however, Mr. Wilson informed me that his increasing practice as a surgeon made it convenient for him to give up his occupation as a teacher of anatomy; and he proposed to me that I should take the anatomical school altogether off his hands, giving him 7,000*l.* for his anatomical museum and buildings in Great Windmill Street, including the house attached to them, in which he resided, and which had formerly been the residence of William Hunter, and then of his nephew, Dr. Baillie. But I had no money of my own at my disposal, and even if my friends could and would have assisted me, I had little disposition to lay myself under such an obligation. I had at that time a very intimate friend, Dr. Harrison, who, like many others of my early friends, has long since been no more (a very zealous person in the pursuit of his profession and the sciences connected with it), and he suggested that we might establish ourselves conjointly as lecturers in anatomy elsewhere. This we might very easily have done, and there is little doubt that we should have succeeded in the speculation; for Harrison was very energetic in whatever he undertook, and I had myself become very popular with the students. In saying this I do not at all mean to compare myself as a teacher of anatomy with Mr. Wilson, who in that capacity was really preeminent; but I had made my anatomical instructions useful by applying them to the explanation of surgical practice, and I had paid more attention than Mr. Wilson had done to physiology, having on this subject a good deal of original matter to communicate, founded on my own observations. I had, however, good reasons for not acceding to this proposal. It would have been very ungracious towards Mr. Wilson, who had always treated me with much kindness, and such a step on my part would have made it difficult for him to dispose of his interest in the Windmill Street School to any one else; and I had myself abundant occupation besides afforded me in the performance of my duties at the hospital and as a lecturer on surgery. Having consulted Dr. Baillie and Sir Everard Home on the subject, I found that their advice corresponded with my own inclinations; and I therefore communicated to Mr. Wilson, *first*, that I must decline the offer which he had made me, and *secondly*, that I would not stand in the way of his making the arrangement that he wished to make with some other person, and that I would willingly retire whenever he had done so. The result was that Sir Charles Bell purchased Mr. Wilson's museum, and took my place as a lecturer on anatomy.

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* The Council of the Royal Society have allowed me to copy this paper, and it will be found in this edition of the author's works.—C. H.

I had been engaged as a teacher of anatomy for seven years, passing always a part of each day in the dissecting-room. Thus I had become very familiar with the subject, so that the impressions made on my mind, and repeated over and over again at a period of life when the memory is in its greatest vigour, have never since become erased. Even at the present day, after the lapse of forty years, I retain all the anatomical knowledge which is required for the purposes of professional practice; and I have little doubt that if I were to return for a short time to the labours of the dissecting-room, I should have no difficulty in resuming my early duties as a demonstrator of anatomy. I have, therefore, nothing to regret in having ceased to be an anatomical teacher, while I am at the same time aware that if I had done otherwise, I should not have been able to obtain so extensive a knowledge of diseases and of surgical treatment as I now possess.

During the two or three following years my recollection furnishes me with very little which is worthy of being recorded even in this egotistical memoir. My mode of life was uniform enough. I was constant in my attendance at the hospital, not only doing what was required for the patients, but taking notes of and studying their cases, attending to what little private practice I had obtained, seeing from time to time some of Sir Everard Home's patients when he required assistance or was out of the way, assisting him in dissections in comparative anatomy, and reading some professional books, not in any very systematic way, but for the most part using them for the purpose of reference as the occasion required. At the same time, though there was little variety in my pursuits, my life was by no means monotonous. I had the advantage of a good deal of agreeable society, and in addition to those whom I have already mentioned, had acquired some valuable friends. Among these I may especially mention Sir Thomas Plumer, who, when I first knew him, held the office of Attorney-General, and afterwards that of Vice-Chancellor and Master of the Rolls. There was as much friendship between us as there could be between a very young man who was working his way upwards, and another nearly thirty years more advanced in life; and from him and his family I received the most constant kindness and attention until the period of his death, in the year 1823. I am not certain whether it was in 1814 or 1815 that I first became acquainted with the late Lord and Lady Holland. As I have already mentioned, Lord Holland's father had been my own father's friend and patron, to whom he was indebted for the only church preferment which he possessed. My brother-in-law, Marsh, had been Lord Holland's tutor at Christ Church, had afterwards travelled with him on the Continent, and become from that period his most intimate friend. It so happened that Lord Holland had been admitted as a Fellow of the Royal Society on the Thursday after the anniversary on which I received the Copley medal, and when the address made by Sir Joseph Banks to me on that occasion was read as a part of the minutes. It was, I suppose, from this combination of circumstances that I was afterwards invited to Holland House. By degrees I became a frequent visitor there, and was on terms of much intimacy with Lord Holland until he died, in 1840, and with Lady Holland afterwards. I know not how it was that they liked me at first so well as they did; for in general society I was at this time, and for some years afterwards, a shy and diffident young man, contributing very little to conversation, and not feeling myself at home among the politicians and persons of rank who met at Holland House as I did among my friends of the Royal Society and those of my own profession, or of the law. However, so it was; and their friendship and kindness was never interrupted. Lord Holland was himself one of the kindest of human beings, at the same time being a zealous politician; a thorough Whig; a Liberal in the very best sense of the word, and that not only in politics, but in everything else. Not what used to be called a democrat, but at the same time valuing others more with reference to their general character, talents, and acquirements than to their rank or station. He was an accomplished scholar, well acquainted with general literature, delighting in poetry, and of refined taste, but having little or no acquaintance with science. I remember dining at Rogers's, in company with Sydney Smith, his brother Robert, and some others, when a question arose as to who at that time excelled most in conversation, and they all agreed that it was Lord Holland. He was indeed in society a most agreeable person, full of valuable information, which was enlivened by appropriate anecdotes; not claiming too large a share of attention for himself: a good listener as well as a good talker. He had also this excellent quality, that he never spoke ill-naturedly of others; while he was continually heard to say, when he thought that others erred a little in this respect, 'Come, now, I think that you are a little too hard on him.' He might sometimes have indulged in some good-humoured sarcasm, but he never went beyond this. Lady Holland was a woman of strong sense, with considerable knowledge of human nature; a zealous and active friend, but with considerable prejudices. Some held her to be capricious, but I have certainly no cause to complain of her in this respect. Fortunately I had no favours to ask of her or of any one else; but during thirty years of intimate acquaintance with her, I never knew her miss an opportunity of showing me any small mark of kindness in her power. At Holland House I made some valuable acquaintances; among whom I may especially mention Samuel Rogers, Sydney Smith, and Allen. The latter had originally travelled on the Continent with Lord and Lady Holland as their medical attendant. When I knew him he was master of Dulwich College, and resided with them as a friend rather than in any other capacity.

He had formerly been a lecturer on physiology in Edinburgh, but afterwards had devoted himself almost entirely to general literature and history. He was a considerable Anglo-Saxon scholar, this being with him a favourite pursuit; but he had a vast knowledge on all subjects, and was a most instructive companion. At Holland House, also, I became acquainted with Lord Holland's son Charles, now General Fox, and he has continued one of my very best friends down to the present day. Without his literary attainments he has many of his father's qualities—sincere, open, generous—with a character so transparent that whoever knows him must know him thoroughly.

I had previously, although not apparently a very strong person, enjoyed sufficiently good health, and had been able to go through a good deal of rather severe labour; but in the autumn of 1814 my health began to fail. I became dyspeptic, and lost flesh, and altogether looked so ill that many of my acquaintance believed that I laboured under some serious organic disease. I was told of a medical dinner-party in which the question arose as to who would make the next vacancy at St. George's Hospital, and they all agreed that it would be myself. I attribute my illness to unceasing occupation of mind and body for a long period, and partly to having been during ten years in London, never breathing the air of the country for more than two or three days at a time, and even then only on some rare occasions. My indisposition was not sufficient to prevent my attending to my profession as usual; but it depressed my spirits, made exertion difficult, and my life altogether wearisome and uncomfortable. I continued to suffer—sometimes more, sometimes less—until the following autumn, when I went, accompanied by my friend Brande, for a short time to the sea-side. It was remarkable how much, and what immediate refreshment this change of air and freedom of labour afforded me. I returned to London quite an altered person, and had only an occasional recurrence of my former symptoms during the following winter.

During the long war in which we were engaged, with only a brief intermission, from 1793 to 1815, we had little or no intercourse with scientific or professional men of other countries. On the conclusion of the war, however, several of our *collaborateurs* on the Continent visited this country, with some of whom I became well acquainted. Among these were Roux (who was at that time surgeon to the Hôpital de la Charité, and who afterwards succeeded to the same office in the Hôtel Dieu, and was for many years the principal surgeon of Paris), Orfila, and Magendie; and then Ekstrom of Stockholm, Wagner, and others from Germany. There was a Milanese professor, Assalini, who had been with Napoleon in Egypt and Russia, was present at the burning of Moscow, and used to give us some curious details of what occurred in those expeditions. Dupuytren was here only once, and that some years afterwards, when he came to be present at a marriage in the Rothschild family. Among the men of science not immediately connected with the medical profession, those whom I knew best were Blainville and Berzelius. I saw Humboldt only on two occasions, once at Sir Joseph Banks' soirée, and once at the Royal Society. On the last occasion I walked back with him to the west end of the town from Somerset House, and I remember that he talked without intermission, displaying an immense store of knowledge, but passing from one subject to another, often without there seeming to be any very due connection between them When I afterwards read that very remarkable, but rather unreadable, production of his later years, 'Cosmos,' it reminded me very forcibly of the conversation which I had with him, or rather which he had with me, more than thirty years previously.

In what I am now writing, I do not pretend to give an account of my domestic life; I must not, however, omit to notice the most important event belonging to it, and which must have exercised a great influence over my professional life also, which occurred in the year 1816. Serjeant Sellon, who had been a barrister of a good deal of repute, and well known to lawyers as the author of 'Sellon's Practice,' a work much valued by the legal profession, had been for some years a friend of my elder brother, and through him I became acquainted with the Serjeant's family. His third daughter and myself became much attached to each other; and in the spring of the year above mentioned she became my wife. She was nineteen years of age, and I had not quite completed my thirty-third year. At the time at which I am now writing (1855), we have been married nearly thirty-nine years, and our affection for each other has remained unaltered. She has been an excellent wife to myself, and an excellent mother to our three surviving children. That they have turned out such worthy members of society, and have been a source of so much happiness to ourselves, is to be attributed mainly to the trouble which she took from the very earliest period of their lives in training their moral character, at a time when I was too much engaged in my professional duties to be able to pay the necessary degree of attention to them myself. What has occurred in my own family confirms the opinion which I might, indeed, have been led to form from what I have seen elsewhere, that the characters of individuals depend much more on the mother than on the father, the mother having the chief management of them during childhood, when the mind is more pliant, and when permanent habits are more easily established than is the case in after years.*

It may be worth while to mention that, in the year of my marriage, my professional income, derived from professional fees and lectures, amounted to 1,530*l*. I had previously saved sufficient money to refurnish and paint my house, and in other ways make it more fit than it had been before for the reception of a bride. I now, for the first time, had a carriage and pair of horses. In other respects, we made very little addition to my former establishment. As my wife had no fortune given her at the time of our marriage, nor indeed any except what had been settled on her after her father's and mother's deaths, and as my profession entailed some expenses on us, we were under the necessity of being careful as to our mode of living. My dear wife had no expensive habits, and we managed to make both ends meet at the end of the year. Still, I cannot but say that this was a period of considerable anxiety, when I felt for the first time that another individual as well as myself, and probably children hereafter, had to depend, not only on my professional character, but also on my bodily health. Fortunately, in the beginning of the following year there was a more manifest increase of my practice than there had ever been before. This kept my anxiety within bounds; still it was considerable, and was probably the cause of my having some return of the dyspeptic symptoms under which I had laboured formerly, and which continued to trouble me, from time to time, for the two or three following years.

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* Lady Brodie died in July 1861.—C. H.

Although, between my increasing practice, my duties at the hospital, and my lectures, my time was considerably more occupied than formerly, I nevertheless found some leisure for the cultivation of physiology. It was at this time that I made the experiment of passing a ligature round the choledoch duct, of which I afterwards published an account in 'Brande's Journal.' The conclusion at which I arrived was, that the interruption of the flow of bile into the intestine stopped the formation of chyle. The experiment was repeated by Herbert Mayo in London, and by Macartney in Dublin, with the same result. Dr. Blundell, who was at that time lecturing on Physiology at Guy's Hospital, made the same experiment, not knowing that I had made it previously, and he also arrived at the same conclusion. When I afterwards published my statement, Dr. Blundell complained to Mr. Green that I had robbed him of his discovery. This led to a comparison of dates, and it turned out that my first successful experiment had been made just three weeks before his. Since then, Tiedemann and Bernard have repeated the experiment, and, as they declare, with a different result—the latter being of opinion that it is the secretion of the pancreas, and not that of the liver, which is the principal agent of chylification. M. Bernard is led to believe that the disagreement between his experiment and mine is to be explained by my having included the duct of the pancreas in the same ligature with the choledoch duct. Other engagements have prevented my prosecuting the enquiry further. I am, however, far from being convinced that

Mayo, Macartney, Blundell, and myself, have been in an error. I do not find that the other experimentalists paid attention to the contents of the intestine after the flow of bile had been suspended. If they had done so, they could not have failed to remark the very striking difference which there is in them where the bile does not flow into the intestine, as compared with that which exists where the flow of bile has not been interrupted.

In the two or three years which followed my marriage I find little worth recording. My eldest son was born in the winter of 1817. In 1818 we had another child, a little boy, who was named Alexander, after my kind friend Mr. Alexander Brodie, father of the present Duchess of Gordon. Our little Alexander, however, was taken from us when he was about a year old. Our daughter was born in the following year,* and our youngest son in the autumn of 1821. We have had no other children.

It was in the year 1817 or 1818 that I first formed a rather intimate acquaintance with the late Sir William Knighton. In the year 1815 Sir William was in attendance on the Duke of ——, in a very serious attack of illness which terminated fatally. I was applied to for the purpose of examining the body after death. Some foolish or ill-disposed persons had persuaded the duchess that Knighton had mistaken the nature of the duke's complaint, and that he had treated him improperly. The examination which I made proved that this charge was altogether unfounded. After I had sent my written report the duchess asked me to call upon her, and she and her sister cross-examined me on the subject, being, as it appeared to me, very ready to attribute blame to the physician. I took his part, as it was my duty to do, and believed that I had satisfied them that the opinion which they had been led to form was erroneous. Not a word ever passed between Knighton and myself on the subject. But from this time he became one of my warmest and kindest friends. As his history is somewhat remarkable, I think it worth while to take this opportunity of giving some account of it.

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* The daughter married the Rev. Edward Hoare, and died in 1863.—C. H.

He was of humble origin, and I believe that he had originally practised for a short time as an apothecary at Plymouth. While there he married the present Dowager Lady Knighton. She was a Miss Hawker, and one of a family of great respectability well known in Devonshire; being herself a very superior person both morally and intellectually, and highly accomplished. After his marriage Mr. Knighton went to Edinburgh, studied there, and graduated as a physician. He then came to London, took a house in Maddox Street, and engaged in practice as a physician and accoucheur. He had at first few friends; but he was ambitious and determined to succeed. He devoted himself wholly to his profession, being always to be found, and not at all mixing in general society. With great natural sagacity, he had most agreeable and engaging manners, and the result was that in the course of a very few years he obtained a very large practice. During the war he accompanied the Marquis Wellesley when he went on a temporary diplomatic mission to Spain. On his return to England Lord Wellesley introduced him to the Prince Regent, and soon afterwards he was created a baronet.

According to common report, which I believe in this instance to have been well-founded, an accidental circumstance led to his being more intimately acquainted with the regent. McMahon, who at that time held the office of Keeper of the Privy Purse, died, and in his will named Knighton as his executor. Among the papers of the deceased were found some which belonged to the regent which ought to have been destroyed. Knighton at once took the papers to the regent, and from that time was his friend, exercising a considerable influence over him. I do not pretend to unravel the mysteries of a court, but of this I feel assured, that however much the production of the papers might have contributed to it in the first instance, he was indebted for the long continuance of the regent's favour more to his engaging manners, his knowledge of the world, his habits of business, and his usefulness, than to anything else. When Sir Benjamin Bloomfield (who after McMahon was Keeper of the Privy Purse) was made a peer, and became our minister at Stockholm, Knighton was appointed to succeed him, and he retained his office until the death of his master in 1830.

Knighton was a man of considerable natural powers. He had great sagacity, a very clear head, and an excellent judgment, seeing at once the main points of the question before him divested of those which were of no real importance. He was one of that very limited class of persons who have great influence over the minds of others. This may be attributed in part to his engaging manners, but more to the circumstance that he entered, or seemed to enter, into the views and interests of those for whom he entertained a regard as cordially as if they were his own. Having been originally imperfectly educated, he was deficient in some of the qualities which would have fitted him for general society, but these defects were more than compensated by his ready insight into the characters of other men, and his knowledge of the world, and of what goes on in the world. In his profession, with much practical knowledge, he had no scientific attainments. He pursued it in the first instance with no other object than that of obtaining a livelihood, and afterwards with a too great anxiety to amass a fortune. This was his principal failing, and in the latter part of his life he acknowledged to me that he was conscious that it had been so. The existence of it in his case, as in that of many others, is to be explained by the circumstance of his having passed his early years in poverty, contending with difficulties, but with very ambitious aspirations.

When the regent first proposed to him that he should belong to his household, Lady Knighton very much objected to his doing so. At first, and for several years after his master succeeded to the crown, everything went on smoothly. He was very useful, and the king's private affairs were managed in a way in which they had never been managed previously. His situation became very disagreeable, and, as he informed me, he wished to resign his office. But Lady Knighton showed him that, having once undertaken it, he could not with propriety do so, especially as he still retained the king's confidence, as was shown by his relying on his advice, and by his leaving him his executor, in conjunction with the Duke of Wellington. On the whole, I am satisfied that he would have been a happier person if he had never entered on this new career. It is worthy of notice that he studiously avoided leading his family to follow his example. I do not believe that either Lady Knighton, or his son, or daughters, were ever presented at court. After the death of the king he mixed little with the world, leading a very retired life at his residence in Hampshire. He survived the king only six years, and Sir Stephen Hammick,* Dr. Chambers, myself, and one other friend, were the only persons, besides his son, who attended his funeral at the cemetery at Kensal Green.

In the year 1818 I experienced the loss of a very good friend by the death of Sir Richard Croft. He had married my first cousin, one of the daughters of Dr. Denman, and was from an early period of his life in large practice as an accoucheur among the aristocratic classes of society. Unfortunately he was engaged to attend the Princess Charlotte of Wales in her confinement. The child was born dead, and the princess herself expired soon after her delivery. This disastrous result affected him deeply. Sir Richard was a man of acute feelings, a thorough gentleman, having a high sense of honour, and of a kind and liberal disposition. In the early part of my career he did me much service by recommending me to his patients for those smaller services for which they might reasonably apply to a young practitioner. He was the younger son of an old family whose fortune had evaporated. On the death of his elder brother, Sir Herbert Croft, he succeeded to one of the oldest baronetcies, and to nothing else.

During the first two or three years after our marriage we continued to reside in the small house in Sackville Street in which I had resided previously. In the beginning of the year 1819, however, I took a house of greater pretensions in Savile Row, and we remained in it until we removed to a larger one in the same street, which we still inhabit. As my income had been steadily

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* Sir Stephen Hammick was born in 1777, and created a baronet in 1834. He was surgeon to the Royal Naval Hospital at Plymouth; he afterwards practised in London. He has for some years retired from the profession.—C. H.

at 36 Cavendish Square

increasing, I felt myself to be guilty of no imprudence in making this change, and the event justified me in doing so, as my income in 1819 exceeded that of the previous year by more than 1,000*l*. This increase may be in part attributed to the publication of the first edition of my work on 'Diseases of the Joints,' which had taken place in the previous year. Other circumstances, however, contributed to it. Although I was no more than thirty-six years of age, my name had been for several years before the public. Sir Astley Cooper, who had succeeded to the large practice of Mr. Cline and the smaller one of Sir Everard Home, too confident of his position, had already begun to lose some of the vast reputation which he had previously enjoyed. Some one else was wanted, and I was ready to fill the vacant place. From this time my practice steadily increased, so that almost every year made considerable additions to it. Hitherto my income had been little more than sufficient to meet my annual expenditure, but I now began to lay by a considerable portion of it; and finding that I had the prospect of providing for my family, and of acquiring in the course of no very long time a moderate independence, I was relieved of much of the anxiety which I had formerly experienced.

In the same year in which I entered my new habitation, 1819, Lawrence having resigned the Professorship of Comparative Anatomy and Physiology at the College of Surgeons, the council of the college appointed me to succeed him, and I delivered my first course of lectures there in the year following. I do not know whether I acted quite wisely in undertaking that office. With an increasing practice, my lectures on surgery, and my duties at the hospital, I had an abundance of occupation, and the having every year to make a fresh course of lectures on subjects on which I had not lectured previously was an almost frightful addition to my labours. It was only by giving up many hours which ought to have been devoted to sleep that I was able to fulfil my engagements, and even with this sacrifice I had not the satisfaction of knowing that my lectures were such as I could have wished them to be. On the other hand, in the composition of my lectures I had to go to the bottom of many things with which I was before only superficially acquainted, and thus I acquired much information which I should never have possessed otherwise, and which has been a source of interest to me ever since. I held the professorship until the year 1823, and delivered four courses of lectures. The two first courses related to the structure and physiology of the organs of respiration and circulation. In the third course I considered the organs of digestion; the subject of the last course being the anatomy and functions of the nervous system.

I may take this opportunity of observing that I have found few things to contribute more to my own improvement than the composition of my lectures, and the habit otherwise of recording my knowledge and thoughts in writing. It has enabled me to detect my own deficiencies, to avoid hasty conclusions, and has taught me to be less conceited of my own opinions than I should have been otherwise. Another result has been to give many things a permanent place in my memory, the impressions of which without such artificial help would have been evanescent. In the early part of my life I was accustomed to make written notes of books which I read, a few of which are still preserved among my papers, and I refer to them with no small degree of satisfaction as having rendered me an important service.

It was in the year 1821, and while I held the office of professor at the College of Surgeons, that I was first called on to attend the king, George IV., under the following circumstances. His majesty had one of the common encysted tumours which occur on the scalp, which was large enough to be troublesome to him. He showed it to Sir Everard Home, who advised him to have it removed by an operation. The king was anxious to undergo the operation. His majesty, however, expressed to Sir William Knighton that he wished the operation to be performed by myself, Sir Everard being, however, present, and Knighton was commissioned to make this communication to me. I cannot say that I derived any particular satisfaction from it, as I found that I had already obtained the patronage of the public, and was quite contented with it. In the meanwhile, however, the subject of the proposed operation was mentioned to Lord Liverpool, who was then prime minister. Lord Liverpool represented to the king that it was a matter which might concern the public as well as himself, and urged that nothing should be done without Sir Astley (then Mr.) Cooper being first consulted, and that, if an operation was determined on, that Sir Astley should perform it. Sir Astley being at that time the most conspicuous person in his profession, I cannot doubt that Lord Liverpool's judgment was quite correct. Accordingly, Sir Everard Home, Sir Astley Cooper, and myself were summoned to Windsor; when, after examining the tumour, we agreed that nothing but an operation could be of any service, and that it should be performed when the king returned to London. Mr. Cline was consulted afterwards, who confirmed the opinion which we had given. Eventually the operation was performed by Sir Astley Cooper, in the presence of Sir Everard Home, Mr. Cline, Sir William Knighton, the king's physicians, Sir Henry Halford, Sir Matthew Tierney,* and myself, making indeed a very large assembly for so small a matter. After this attendance, Cooper was created a baronet, and Sir Everard Home was comforted by being appointed to the office of surgeon to Chelsea Hospital, vacated by the death of Mr. Thomas Keate, and by his son, who was then a very young lieutenant in the navy, being advanced rather prematurely to the rank of commander. From this time, when any surgical operation was required, the king, for some years, was in the habit of applying to Cooper; but on some special occasions I was summoned to meet him in consultation, though I held no actual appointment in the royal household until the year 1828, when, on Sir Astley having been appointed Serjeant-Surgeon, I was gazetted as surgeon to his majesty's person in his place.

In the year 1822, Mr. Griffiths, one of the principal surgeons of St. George's Hospital, having been compelled by ill-health to resign his office, I was, as might have been anticipated, elected without any opposition as his successor. For many years after my first being appointed assistant-surgeon, Sir Everard had very little interfered with the management of his patients, and from this circumstance, and from that of my having had for many years the charge of Mr. Gunning's patients during his absence in the Peninsula, I had abundant opportunities of improving myself in my profession.

In the early part of the year 1823 I sustained a severe loss by the death of my affectionate friend Sir Thomas Plumer, who sank at last under the influence of a local disease, which had tormented him for fourteen or fifteen years; but which, nevertheless, had not interfered with the able and conscientious discharge of his duties as Solicitor-General, Attorney-General, Vice-Chancellor, and Master of the Rolls, which last situation he occupied at the time of his death. As I have already mentioned, I had been intimately acquainted with him and his family for eleven or twelve years, had been his frequent visitor at Cannon's Park, where he resided during his vacations, and had received from him such undeviating kindness and attention as could not but be very acceptable to a young man who was labouring to make his way in a profession, without having as yet reaped the advantage of his labours.

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* Sir Matthew Tierney, who was born 1776, practised half the year in London, and half at Brighton, was created a baronet in 1818; he received a second patent in 1834, entailed on his brother, and died 1845.—C. H.

In the autumn of the same year the medical profession was deprived of one who for many years had occupied perhaps the most conspicuous place in it, and was indeed one of its brightest ornaments, by the death of Dr. Baillie. I have already mentioned that he had married my first cousin, one of the daughters of Dr. Denman. In consequence of this connection, I had the opportunity of becoming well acquainted with him.

The nephew of William Hunter, he had, on his uncle's death, and at a very early period of life, become established as the principal lecturer in the then famous Anatomical School of Great Windmill Street. He had left off teaching anatomy two or three years before I began my studies in London, and after another year he had resigned his office as physician to St. George's Hospital, so that I had no opportunity of personally knowing him as a teacher either in one place or in the other. That he was excellent as a lecturer is proved by his large and constantly increasing class, and by the high estimation in which he was always held by those who had been his pupils. In the beginning of the present century, being then about forty years of age, he had acquired a very considerable share of private practice, which rapidly increased, until it exceeded in extent not only that of any one among his contemporaries, but probably of any other physician who had preceded him since the days of Radcliffe and Mead. His reputation was of the highest order, as it depended on the opinion entertained of him by the members of his own profession, who always looked up to him as the fittest person to be consulted in cases of difficulty or danger. Their preference of him is to be attributed partly to his knowledge and sagacity, especially in what related to the diagnosis of disease, and partly to his general character, which led him to be always liberal and considerate as to others, at the same time that he never seemed to be anxious about his own reputation, or to take any trouble to obtain peculiar credit for himself. He had also another important qualification for the situation of a consulting physician. He not only had a very clear perception of the matter which was placed before him, distinguishing at once that which was essential from that which was merely incidental; but his habit of lecturing had given him a considerable command of language, which enabled him to explain even a complicated case in a way which was satisfactory to the patient and his friends. In these explanations he never gave his knowledge for more than it was worth, nor pretended to know more than he knew in reality; and this simple and straightforward mode of proceeding was one reason why the public reposed in him a degree of confidence which those of more ambitious pretensions were wholly unable to attain.

Being the only physician of that time who had been engaged in teaching anatomy, the public naturally, and very justly, considered that he must have some knowledge of disease which others, in his department of the profession, did not possess. But this was not all. Bred up in W. Hunter's museum, of which the anatomy of diseased structures formed an important part, and having had ample opportunities of investigating disease by dissections at St. George's Hospital, he had become, after his uncles, William and John Hunter, the most distinguished pathologist of the day. His work on Morbid Anatomy, which he had published while comparatively a young man, is still the most valuable textbook on that subject that exists. Very much has been added to the knowledge which it contains by the labours of later pathologists, and the use of the achromatic microscope has added another kind of investigation to that which was adopted formerly: still, it is perfect as far as it goes; and the clearness, conciseness, and simplicity of the style, and the brief but accurate sketches of the symptoms during life, which are appended to the account of the appearances after death, have the effect of rendering it a more important help to the practitioner (whose object is to recognise the diseases which come before him, and not merely to study pathology as a curious science), than most of the more elaborate treatises which have been since published.

As a contributor to medical literature, Baillie's reputation rests almost wholly on the work of which I have now been speaking. He published, however, a few rather interesting, but not very important papers in the 'Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge.' It would be unfair to measure his reputation by some papers which were published after his death, written during his declining years, when he had outlived the vigour of his intellect.

Baillie was not originally (as I apprehend) a man of great physical powers. It seemed to me that he found exertion, either of body or mind, beyond a certain point always inconvenient and painful. As a young man, he had studied anatomy and physiology, so as to make himself thoroughly qualified for his office as a teacher; but he never went beyond this, nor entered on any original investigation in either of these departments of knowledge. When he was fully engaged in private practice, his labours were very arduous. He rose at six o'clock in the morning, and was occupied until he breakfasted at eight o'clock, in answering the letters of his correspondents; from that time he was employed in seeing patients until six or seven o'clock in the evening, when he returned home to dinner. He had to make another round of professional visits in the evening, and seldom retired to rest much sooner than twelve o'clock. These labours continued for several successive years. At the same time, however, he allowed himself a vacation during the summer, which gradually became prolonged from three weeks to three or four months. Notwithstanding this periodical retirement, he had always the appearance of being overworked. He was nervous and irritable, and while others looked, if not with envy, with some sort of admiration at his large practice, he complained of it as if it were a great hardship, and I have no doubt felt it at the time to be so. His professional brethren had little sympathy with and smiled at these complaints; yet they were well-founded, and I suspect that he would have been a happier man, and have lived longer, if he had had a smaller amount of professional success. For some years before he died he had limited his practice by acting merely as a consulting physician with other physicians or surgeons; at the same time, passing two days in the week in Windsor Castle, taking his turn with the other physicians, who were in attendance on King George III. during the long period of his mental derangement. But he did not make this change until both his mind and body had suffered from the over-exertion of preceding years; and no one who knew him merely towards the close of his career could form a right notion of what he had been formerly. He left to his son a sufficient, but not a large fortune. He might have left a much larger one if he had made it his object to do so. But he had no desire to be rich, and was liberal not only to his patients but to others, performing, as I have reason to believe, many acts of charity and kindness. The irritability of temper, to which I have already referred, led him at times to say hasty and somewhat ungracious things, for which he was always sorry, and apt to worry himself afterwards. Mrs. Baillie was a lady of great good sense, an excellent adviser, and a great help to her husband in a variety of ways.*

In the year of which I am now speaking (1823) I had already obtained a considerable private practice, my income from fees alone, independently of what was derived from my surgical lectures and my pupils at the hospital, amounting to 6,500*l.* From this time my practice went on for many years steadily increasing; there being only one year (after the financial crisis of 1825–26) in which there was any falling off, and this not to any considerable extent. It was now my object to devote myself as much as possible to my profession, and to take advantage of the favourable opinion of the public, so that I might make a provision for myself and my family. Accordingly, I never absented myself from London for more than three weeks in the summer, and sometimes not at all. During the empty season, I engaged at first a ready furnished house at Hampstead, and afterwards had a permanent residence there, at which my family remained, and where I dined and slept, coming to London every morning after an early breakfast. My receipts were such that I was able every year to lay by a considerable sum of money, so that I had no further anxiety as to the fate of my wife and children, in regard to pecuniary matters, if I should be taken from them. But I had anxieties of other kinds. I had now a large share of operative surgery; far more than fell to the lot of any other individual in the metropolis. Sir Astley Cooper's practice was beginning to decline, and he finally quitted London for a considerable time in the year 1828, and the greater number of patients, who would otherwise have applied to him, now resorted to myself. I was never much attached to this department of my profession, which I considered as requiring far less of intellectual accomplishments than the diagnosis of disease and the treatment of it in other ways. However, I could not venture to refuse what was offered to me, and I hope that I did justice to those who reposed confidence in me by sparing neither time nor trouble, and by neglecting nothing that could in any degree contribute to bring a case in which I was engaged to a successful termination. The only operation that gave me any real concern was that of lithotomy. Among the affluent classes of society, lithotomy is very rarely required for children, and hence those who form the very great majority of patients in the hospital, form a very small proportion in private practice. But lithotomy in adults is always dangerous, and among what are called the higher classes of society it is more dangerous than among the labouring classes; as those belonging to the former are apt to defer applying for relief to the last moment, when the extension of disease has made them less fitted to undergo an operation than they would have been at an earlier period. After the year 1835, except in the hospital, I scarcely ever had recourse to lithotomy at all, substituting for it that of lithotrity, of which my experience leads me to believe that, in the hands of one who has taken the necessary pains to understand it, it is attended with less risk as to life than almost any other of the capital operations of surgery.

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* Dr. Baillie was physician to St. George's Hospital from 1787 to 1800. He died in September 1823, aged 62.—C. H.

At the period of which I am now speaking, a great change had gradually taken place in the medical staff of our hospital. Sir Everard Home had resigned the office of surgeon, residing at the house which belonged to him as surgeon of Chelsea College. Mr. Gunning had retired also and become a resident in Paris. Mr. Robert Keate was now the senior surgeon, Jeffreys and Rose were the two junior surgeons, that is, juniors to myself at the hospital, though my seniors in years. The physicians were Dr. Pearson, Dr. Nevinson,* Dr. Chambers, and Dr. Young.† Of these Dr. Nevinson was an excellent practical physician, and had a vast reputation among the members of his own profession. He might with the greatest ease have succeeded to a very large private practice—probably equal to that of Baillie himself. But this formed no part of his ambition, and while he devoted a very large portion of his time not only to the in-patients, but also to the out-patients of the hospital, he seemed to shrink from the more lucrative engagements of his profession. The same could not be said of Dr. Pearson, who, however, never succeeded as a practitioner, except to a very limited extent. In fact, circumstances, combined with various eccentricities, stood in his way, though he was a person of considerable genius, and had obtained a good deal of credit by some papers published in the 'Philosophical Transactions.'* Young, one of the greatest philosophers of the age, and indeed second to none but Davy, never prospered as a physician. His biographer, Dr. Peacock, has ascribed his failure to his being too good for his profession, and to his being above certain ignoble arts, which were, as he believed, made use of by his competitors, and he has availed himself of this opportunity of publishing a very illiberal tirade against those who belong to this division of the medical profession. Nothing can be more unjust than the whole of Dr. Peacock's observations on this subject. There may be among physicians, as well as in other professions some individuals who acquire a reputation to which they have no claim, but my experience justifies me in asserting that no physician acquires a *large* reputation, or retains what may be called an extensive practice, who is really unworthy of it. The public are, on the whole, pretty good judges in a matter in which they are so much interested, and if by any accident they have been led to give their confidence to a wrong person, they are seldom long in discovering and correcting their mistake. With regard to Dr. Young, the truth is that either his mind, from it having been so long trained by the study of the more exact sciences, was not fitted for the profession which he had chosen, or that it was so much engrossed by other, and to him more interesting pursuits, that he never bestowed on it that constant and patient attention without which no one can be a great physician, any more than he can be a great surgeon, or a great lawyer, or a great statesman. The students at the hospital complained that they learned nothing from him. I never could discern that he kept any written notes of cases, and I doubt whether he ever thought of his cases in the hospital after he had left the wards. His medical writings were little more than compilations from books, with no indications of original research. I offer these observations as a matter of justice to others, and not in depreciation of Dr. Young, for whom I had a great personal regard, whose vast and varied attainments out of his profession, and whose great original genius displayed in other ways, place him in the foremost rank of those whose names adorn the annals of our country. Dr. Peacock mentions as a proof of his superiority as a physician, that the list of his hospital patients presented a larger proportion of cures than that of any of his colleagues. I doubt not that the statement is true, but the conclusion from it is wrong. Hospital patients as well as private patients have their preferences, and those who labour under dangerous diseases will take some trouble to be admitted under the care of the physician or surgeon in whom they repose the greatest confidence; while those whose ailments are less important are contented to take their chance of being admitted under one person or under another. Moreover, many patients are sent to a hospital by private practitioners, and it is no matter of wonder that those who, if they themselves laboured under severe illness, would consult not Young, but Chambers or Nevinson, showed the same preference as to poor persons in whom they were interested.

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* Dr. Nevinson was physician to St. George's Hospital from 1800 to 1825, and died in 1846, aged 72.—C. H.

† Dr. Young was physician to St. George's Hospital from 1811 to 1829, and died in 1829, aged 55.—C. H.

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* Dr. Pearson was physician to St. George's Hospital from 1787 to 1828, in which year he died, aged 77.—C. H.

Of my other colleagues whose names I have mentioned, Dr. Chambers was at that time but little known to the general public. But he was assiduous in his attentions to the hospital, and laying up that store of experience which afterwards enabled him to attain the highest position in his profession. He had great natural sagacity, and a clearness of perception and judgment which enabled him at once to see the important part of whatever subject was placed before him, discarding all irrelevant matter. He had other and, I may say, still higher qualities, which caused him to be very generally popular. He was a gentleman in the best sense of the word: honourable in his dealings with others; kind and affectionate to his friends; using no mean arts to enhance his own reputation or depreciate that of others. To this may be added that he was an accomplished scholar, and having extensive literary attainments. I owe much to the long intimacy which existed between us, and which terminated only with his death. Rose and Jeffreys, though, as I have already stated, my seniors in age, were my juniors in the hospital. Their career was short; the former being taken from us in the year 1829, and the latter in a year or two afterwards.

Although I had been previously consulted by the King (George IV.), it was only on some rare occasions. In the spring of 1830 some symptoms under which his majesty had long laboured, arising from disease in the semilunar valves of the aorta, became much aggravated, and thus commenced the illness which terminated in his death some months afterwards, and during which he was attended by his physicians, Sir Henry Halford and Sir Matthew Tierney. It was early in May that Sir William Knighton called on me one forenoon, and said, 'I have the king's commands that you should accompany me immediately to Windsor. They have got into a difficulty, and you must come and see if you can help them out of it.' On my arrival I found that the king's lower limbs were dropsical and enormously swollen, and that they had been scarified with a lancet, the consequence of which was that the swelling was not at all relieved, and that they were highly inflamed and in danger of gangrene; a further delay of twenty-four hours would probably have placed him beyond the hope of recovery from this local mischief. I at once made a good many punctures with a round needle of the size of that which is known by the name of a worsted-needle. This produced an immense discharge of fluid; and the success of the punctures and of the other treatment which was continued with it was complete. In the course of a fortnight not only were the limbs free from inflammation and reduced to their natural size, but the state of his chest was so much improved that, instead of being scarcely able to breathe except he was in a sitting posture, he could throw himself on his bed and sleep in a horizontal posture with no other support than a pillow under his head. His majesty was not only sensible of the relief which he thus obtained, but full of expressions of gratitude for what I had done for him. After the first three weeks all that I had been especially required to do was accomplished. He would not, however, allow me to discontinue my attendance on him. My habit was to go to Windsor every evening after an early dinner, sleep in the castle, and return to London, after a very early breakfast, in the morning. I generally went to the king's apartments about six o'clock in the morning, and sat by his bedside for one or two hours before my departure, during which he conversed on various subjects, not unfrequently speculating on his own condition and prospects. In his more sanguine moments his mind would revert to the cottage which he had built at Windsor Park, and he expressed the pleasure which it would afford him to return to this his favourite retreat, as if he had found the comparatively retired life which he led there much more suited to his taste than the splendour of Windsor Castle. The impression made on my mind by the very limited observations which I was able to make on these occasions, was that the king would have been a happier and a better man if it had been his lot to be nothing more than a simple country gentleman, instead of being in the exalted situation which he inherited. If William IV. retained his simplicity of character, and his freedom from selfishness, it was because he ascended the throne at a late period of life, having had no previous expectation that he would ever be thus elevated.

I never attended King William IV. professionally. But I saw him occasionally, when I was visiting the Princess Louise (Queen Adelaide's niece, who was brought over from Germany for the purpose of consulting Sir Astley Cooper and myself), and at some other times. It was, I suppose, from the report made to him of his brother's sentiments towards me, that I found him always most kind and gracious. I have in my possession a letter from Sir Matthew Tierney giving me an account of a conversation in which the king expressed very strongly his favourable opinion of me, and declared it to be his intention that, if a vacancy occurred in the office of Serjeant-Surgeon, I should have the appointment. He acted on this intention two years afterwards, when I succeeded Sir Everard Home, who had held that office previously.

The office of Serjeant-Surgeon is of very ancient date, and it has generally been confined to those who have been previously engaged in the service of the royal family. It is held under a patent during the life of the patentee, with a moderate salary attached to it; and hence it is that, as I was originally Serjeant-Surgeon to King William, I am now Serjeant-Surgeon to Queen Victoria. Formerly there were some privileges attached to the office, but an alteration in the constitution of the College of Surgeons having been made by charter in the year 1843, the reason for maintaining them ceased to exist, and by my own suggestion they were discontinued.

I have already mentioned that I began the delivery of surgical lectures in the autumn of the year 1808. I continued to deliver them in Mr. Wilson's anatomical theatre until I had retired from the anatomical lectures. I then engaged a house in Great Windmill Street, in which I constructed a theatre for my lectures, reserving the rest of the house for the residence of a porter, and for a museum consisting of preparations illustrative of surgical pathology. With regard to the latter, I was at first contented with the preservation of such specimens as I was able to prepare with my own hands; but as I obtained an increase of income with an increase of occupation, I engaged the services of Dr. James Somerville as my assistant, and thus, in the course of a few years, I became possessed of a collection of preparations which was admirably adapted for the intended purpose of illustrating my lectures. I continued to lecture in my Windmill Street theatre until the year 1829, and then in compliance with the wishes of my colleagues I transferred my lectures to the theatre of St. George's Hospital, at the same time presenting my pathological museum to the governors of that institution for the use of the Medical School. It has been gratifying to me to find that not only my original preparations have been carefully preserved, but that large additions have been made to them, so that the Pathological Museum of St. George's Hospital, at the time at which I am now writing, is one of the most valuable and useful collections of the kind in the metropolis.

For many years my lectures formed not only a very useful, but a very interesting addition to my employments. As, however, I became more engaged with private practice, I found the delivery of them three evenings of the week (and always more frequently towards the end of the course) to be very inconvenient. I often had scarcely time to eat a hasty dinner before I proceeded to the lecture-room; and then, almost immediately after my lecture was concluded, had to visit patients who required a second visit during the twenty-four hours, or whom I had been prevented from visiting in the early part of the day. Thus I was unable to begin answering the letters of my correspondents, who were always pretty numerous, until a late hour in the evening; and was generally employed with little intermission, from half-past eight in the morning until midnight, besides having not unfrequently to make journeys into the country which occupied a considerable portion of the night. Being thus pressed, I was desirous of retiring from my duties as a lecturer as soon as I had the opportunity of doing so. That opportunity, however, did not occur until the year 1830, when I was enabled to give up my class to my junior colleagues at the hospital, Mr. Cæsar Hawkins[*] and Mr. George Babington.[†]

Although I ceased to deliver a systematic course of surgical lectures, I felt that the students of the hospital had just claims on me for instruction; and in addition to the explanation which I was always in the habit of giving them at the bedside of the patients, I continued once in a week to deliver clinical lectures in the early part of the day, during a great part of the year, and probably, with my increased professional experience, was thus able to afford them a greater amount of useful practical information than I should have done if I had confined myself to lectures of the same description as those which I had delivered formerly.

It was in the year 1822 that I published a second edition of my treatise on the Diseases of the Joints. The copies were soon exhausted, and the work was for many years out of print. A third edition, which was I hope much improved, was published in the year 1834, and two editions have been published since. In the year 1832 I published my Lectures on the Diseases of the Urinary Organs. There was no very practical work on the subject previously, and it has now reached a fourth edition. My Lectures illustrative of Local Nervous Diseases were published in 1837. They formed a thin volume, but I believe that I am not wrong in stating that none of my publications have been really more useful to the world than this, preventing a multitude of mistakes which surgeons were apt to make in confounding mere neuralgic affections with more serious maladies. These lectures have now been for several years out of print, it being my intention, if I live long enough, to re-publish them with some others at some future period. Though not belonging to this period of my life, I may here mention that in the year 1847 I published another volume of miscellaneous 'Lectures illustrative of various Subjects in Pathology and Surgery.' Besides these I communicated various papers on Injuries of the Brain, Injuries of the Spinal Cord, and other subjects, to the Royal Medical and Chirurgical Society, which have appeared at various times in the Medico-Chirurgical Transactions.

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[*] Mr. Cæsar Hawkins (grandson of Sir Cæsar Hawkins, Surgeon to St. George's Hospital from 1735 to 1774, and Serjeant-Surgeon) was Surgeon to St. George's Hospital from 1829 to 1861, and succeeded Sir Benjamin Brodie as Serjeant-Surgeon.

[†] Mr. Babington was Surgeon to St. George's Hospital from 1830 to 1843, and died in 1856, aged 61. His father was M.P. for Leicester.—C. H.

I have formerly referred to my having the appointment of Serjeant-Surgeon conferred on me by his late Majesty. This was on the death of Sir Everard Home, in the year 1832.

Sir Everard had for a long series of years occupied a very prominent place in his profession. No account of him has ever been given to the world, and a brief record of what I know respecting him may not be unacceptable to those who may think it worth while to peruse what I am now writing.

He was one of an old Scotch family, and was rather proud of a genealogy the details of which, if I ever knew them, have passed out of my recollection. He had two brothers, one of whom I have seen, a colonel in the service of the East India Company, and the other a painter, who practised his profession (chiefly in painting portraits) with great success in Calcutta. One of his sisters was married to John Hunter, another to Mylne, an architect and engineer of great distinction, one of whose works was the bridge over the Thames at Blackfriars. Home was educated at Westminster School, and had been elected from the college there to an exhibition at Cambridge. At this time John Hunter had proposed to his young brother-in-law to have him educated to his own profession, and by the advice of the head master of the school he gave up his exhibition at the University in order that he might at once avail himself of John Hunter's offer. He studied anatomy at first under William Hunter, and, if I am not mistaken, resided for some time in his house, and assisted him by teaching the students in the dissecting-room. Before his education was well-nigh completed, there was some kind of disagreement between him and John Hunter, which led to his entering the army as an assistant-surgeon. In this capacity he was sent to the West Indies. After some time he became reconciled to his brother-in-law, the process of reconciliation having been promoted by his sending him some specimens of natural history, which were not then so easily obtained as they are at present. On his return to England he resided for some years in John Hunter's house, where he assisted him in his scientific researches, and at the same time taught anatomy to a limited number of pupils in a private dissecting-room. One of these pupils was afterwards John Thomson, who when the Whigs came into office with the Grenville party in 1806 was made by them professor of military surgery in Edinburgh. Some time before John Hunter's death, Home was elected assistant-surgeon to St. George's Hospital; and when that event occurred in 1793, he succeeded Hunter as surgeon to that institution.

On the resignation of Mr. Charles Hawkins, he became serjeant-surgeon to the king (George III.), with whom, however, he never had any personal communication. In the year 1812 he was created a baronet. The title is now extinct, his elder son, a captain in the navy, having died in Australia unmarried, and his other son having died two or three years before.

He retained the office of surgeon to St. George's Hospital until the year 1827. On the death of Mr. Keate in 1821, he was appointed surgeon to Chelsea Hospital, where he had an official residence, in which he passed the last few years of his life.

Sir Everard Home had some very considerable qualities. He had great perseverance, never wasted his time, and whatever special matter he had in hand, would return to his occupation in every interval of leisure from his ordinary pursuits. He had great sagacity, and was never deterred from any undertaking which he had once begun by the difficulties which he met with. What I said of him in my Hunterian Oration, in the year 1837, I believe to present a just view of his professional character: 'He was a great practical surgeon. His mind went directly to the leading points of the case before him, disregarding all those minor points by which minds of smaller capacity are perplexed and misled. Hence his views of disease were clear, and such as were easily communicated to his pupils; and his practice was simple and decided. He never shrank from difficulties, but, on the contrary, seemed to have pleasure in meeting them and overcoming them; and I am satisfied that to this one of his qualities many of his patients were indebted for their lives. Much valuable information may be found in his surgical works, and his observations on Ulcers and on Diseases of the Prostate Gland may be perused with advantage by the best-educated surgeons of the present day.'

Having been educated in John Hunter's Museum, he was at the earliest period of his professional life initiated in the pursuit of comparative anatomy, and he never relinquished it even during those years in which he was most occupied with his practice as a surgeon. This led to his associating on terms of the greatest intimacy with Sir Joseph Banks (over whom he had great influence), and others of that constellation of great men who were at that time ornaments of the Royal Society. His early papers on Anatomy, published in the 'Philosophical Transactions,' are of great and acknowledged value. But, unfortunately for his reputation, his ambition rather increased than diminished, while his mental powers were gradually declining under the influence of gout and increasing years. In his latter days he had an overweening desire to appear before the world as a discoverer; and his friends in the Council of the Royal Society too readily admitted whatever he offered them into the Society's Transactions; and the result has been, that many of his later communications are of such a nature that his best friends found reason to regret that they were published.

Some years before he died, he got great discredit from having destroyed a considerable portion of John Hunter's manuscripts, which had come into his possession as one of Hunter's executors. This act was equally unjustifiable and foolish. It was unjustifiable, because the manuscripts should have been considered as belonging to the Museum, which Parliament had purchased; and it was foolish, because it has led to the notion that he had made use of John Hunter's observations for his own purposes much more than was really the case. I had frequent opportunities of seeing these papers during nine or ten years in which I was accustomed, more or less, conjointly with Clift, to assist him in his dissections. They consisted of rough notes on the anatomy of animals, which must have been useful to Hunter himself, and which would, I doubt not, have afforded help to Mr. Owen in completing the Catalogue of the Museum; but they were not such as could be used with much advantage by another person. In pursuing his own investigations Home sometimes referred to them, but I must say that while I was connected with him I never knew an instance in which he did not scrupulously acknowledge whatever he took from them, and do justice to his illustrious predecessor. Unhappily, he was led afterwards to deviate from this right course, and in his later publications I recognise some things which he has given as the result of his own observation, though they were really taken from Hunter's notes and drawings. One of these is a paper on the progressive motion of animals, and another a series of engravings representing the convolutions of the intestinal canal, and neither of them of much scientific value. When the Duke of Cumberland had been wounded by Sellis in the attempt to assassinate him, he attended the Duke in Carlton House. This circumstance first introduced him to the Prince Regent. The Prince found his society agreeable, and used to invite him frequently to dinner, treating him with much familiarity.

In the year 1834 the King was pleased to elevate me to the rank of a baronet. I cannot say that this had ever been any great object of ambition with me, yet from the way it was done I could not but feel gratified by the honour conferred on me. I have in my possession a letter from my friend General Sir Charles Thornton, who was one of his majesty's equerries, stating that a person who was much in King William's confidence (I conclude it was Sir Herbert Taylor) had informed him that the King had said to him that it was his intention to make me a baronet, though not quite immediately. It was one or two years afterwards, when Lord Grey was quitting his office as prime minister, being succeeded by Lord Melbourne, that Lord Brougham said to me, 'You ought to be a baronet, and I know that Lord Grey intends to speak to the King on the subject, though it has escaped his memory to do so.' At that time my income derived from my savings, and independent of my practice, did not amount to more than about 2,500*l.* or 2,600*l.* per annum; and I thought that the being a baronet would not add very greatly to my own importance, while it might, in the event of my death, rather hamper my elder son. I expressed this to Lord Brougham, and said I should prefer to wait until I had acquired more landed property, and such as anyone having anything in the shape of hereditary rank ought to be able to bequeath to his family. Being, however, at the moment pressed for time, I added that I would speak to him again on the subject. When I saw him on the following day, I was about to repeat my former observations, when he interrupted me by saying, 'It is too late now to think about it—Lord Melbourne applied to the King yesterday, who immediately assented, and the thing is settled;' and so a baronet I became. This change in my condition, however really unimportant in itself, and however small in the eyes of mere aristocratic persons, considerably affected my views and plans as to the future. Prosperous as I was in my profession, I had always felt that I was overworked, and that what I gained in income was counterbalanced by the loss of comfort. It had been my dream (it would, I doubt not, have proved only a dream) that I would, when I had made some further provision for my family, retire from professional practice, and resume my former pursuits in physiology. But now the case was altered. An hereditary rank, however small, without some independent fortune, is really an incumbrance, and I considered it rather as a duty to those who were to come after me not to leave them in this situation. Thus I was led to persevere in my former course; and it was not until three or four years afterwards that, by affording myself a long vacation during the summer and autumn, I obtained any considerable relaxation from my labours.*

In the year 1834 I succeeded to the first vacancy that occurred, after my being appointed serjeant-surgeon, in the Court of Examiners of the College of Surgeons. I did so not by election, but under the provisions of the charter in virtue of my office as serjeant-surgeon. The original object of this arrangement was, I suppose, that two responsible servants of the crown should belong to the court, instead of it being altogether nominated by the college. In this way Sir David Dundas, who was not at the time even a member of the college, had become one of the examiners about forty years previously. The business of examining young men who are candidates for admission into a profession becomes after some time very irksome; the sameness and tediousness of it being in this instance very little compensated by the moderate pecuniary advantages which belong to it. When a new charter was granted to the college some years afterwards, establishing the order of Fellows, by whom the council were to be elected, and requiring the bye-laws to be submitted to and sanctioned by the Secretary of State, the rule as to the serjeant-surgeons being *ex-officio* members of the Court of Examiners was dispensed with, and I availed myself of this opportunity to resign my office as an examiner.

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* The public very generally much overrate the incomes made by medical men. Sir Benjamin Brodie's professional income never exceeded 12,000*l.* a year—for several years he made about 10,000*l.* annually.—C. H.

Under the original charter of the college, none but members of the council were eligible to the Court of Examiners, and they were very generally elected according to seniority. There was, however, no absolute rule on the subject; and I remember one occasion on which three councillors (no one of whom certainly would have been competent as examiners) were passed over in succession, to elect Lawrence, as to whose qualifications there could be no difference of opinion. The monopoly of the examinership by the council had always been considered as a grievance, and the more so as the examiners received a certain income as the reward of their services. Yet I cannot say that any real harm resulted from it. At the time of my being an examiner, there was only one of my colleagues who had not been an hospital surgeon, and he had been a teacher of anatomy; so that at any rate they had had the opportunity of being qualified for their duties. As to practical surgery, I do not conceive there could have been any much better selection, the examiners being all men who had a large share of professional experience, and such as could not have been found among younger men. In anatomy the examination might have been improved. It was conducted altogether *vivâ voce*, except in osteology. It would certainly have been difficult to procure a regular weekly supply of subjects throughout the year for examination by dissection; but a good deal more might have been done then, and might be done now, by requiring the candidates to describe what they saw in preserved specimens of natural structure, and in those exhibiting the changes produced by disease. The great objection to the *vivâ*-

voce examination is the facility with which a student, having a good memory and a clever tutor, may qualify himself for the ordeal by cramming. This was done then, and is done still to a frightful extent. The same objection does not apply to the examination in practical surgery when conducted by *well-informed and experienced* surgeons. My own view of the matter is, that while hospital surgeons somewhat advanced in their profession should be the principal element in a court of examiners, it will be well to have conjoined with them a certain number of younger men, fresh from their anatomical studies, who, not being much engaged in practice, would have more leisure to bestow on the anatomical part of the examination than the elders of the profession.

It would also be a great improvement on the present system if the examination were conducted at two distinct periods; the one relating to anatomy and physiology taking place when half the period allotted to education was expired, and the other at the termination of the whole.* Further; without giving up the *vivâ-voce* examination altogether, a part of the examination should be always conducted by means of written papers. I own that I think very little of an objection which has been made to the examinations at the college, that they are not sufficiently extensive. It is to be observed that the objects of the examination for the *membership* of the College of Surgeons is merely to ascertain whether the candidate has that minimum of knowledge, without which it would not be safe for anyone to commence practice, and which, if he has sufficient opportunities and industry, and powers of observation, may enable him after some time to become a good and useful practitioner. The first requisite for a good examination is *that there*

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* This suggestion has been since acted upon.—C. H.

should be good examiners. One who is well qualified for the task will seldom fail, in the course of half an hour, to ascertain whether the candidate has made good use of his time as a student; while another, less qualified, who has to prepare himself for the occasion, may persevere in the examination for many hours and blunder at last.

I may take this opportunity of observing that it is a great mistake to compare the examination of young men entering a profession with those for degrees in a university. A senior wrangler may be a great mathematician, and a first-class man in classics may be a first-rate Greek scholar; but the utmost that can be expected of a young lawyer, or physician, or surgeon, is that he should show that he has laid such a foundation as may enable him to profit by the opportunities of experience which may be presented to him afterwards. To be a thorough master of his profession in the beginning of his career is out of the question, and is a thing to be attained only by unremitting study and close observation, continued during a long series of years.

The above remarks do not exactly apply to the examination for the fellowship of the college. The object of this institution is to insure the introduction into the profession of a certain number of young men who may be qualified to maintain its scientific character, and will be fully equal to its higher duties as hospital surgeons, teachers, and improvers of physiological, pathological, and surgical science afterwards. With this view, if they have not university degrees, they are required to undergo a preliminary examination in classics and mathematics; while, their professional education having been continued for a longer period of time, they are expected to show that they have a more perfect acquaintance with those sciences which are the foundation of medical and surgical knowledge than can be expected of the great majority of those who are candidates for practice. If this system be properly and honestly carried out, I apprehend that the result will be that the fellowship of the College of Surgeons will be the most honourable distinction that is offered to the junior members of the medical profession.

For several years during this period of my life I find little as regards myself that is worthy of being recorded. With my constant professional engagements, and being from time to time engaged in writing and in preparing successive editions of my books, it may well be supposed that I had little leisure to attend to other pursuits. The circumstances in which I was placed necessarily brought me in contact with a great number and variety of persons of all grades in society, and from all quarters of the globe; and there was much to interest me in the various phases of human nature that were thus presented to my observation; but this is no more than what happens to all those who have any large dealings with mankind. Either personally, or by correspondence in writing, there were few members of my own profession with whom I was not more or less in communication; but such communications were of course more frequent with those who, like myself, were in extensive practice in London; and of these I feel it rather a duty to say that I found them almost uniformly obliging and accommodating, liberal-minded, and more free from petty jealousies than could be well expected of any body of men who were competing for reputation in the same pursuit. Sir Astley Cooper was still nominally in practice, and I frequently called him into consultation in cases in which either my patients or myself were desirous of having a second opinion: but he was chiefly occupied with anatomical researches, and in making a collection of preparations, which, after his death, was purchased of his nephew, Mr. Bransby Cooper, by the College of Surgeons. For some years after the death of King George IV., Sir Henry Halford retained the largest practice as a physician. The necessary result of the positions which we occupied in our respective departments was that I was in more frequent communication with him than with any other member of the medical profession. He was a clever and sagacious physician, with a great deal of practical information, but without any of that scientific knowledge which is necessary for a right diagnosis of disease. He was on the whole a very useful and successful practitioner; but his views of disease were limited, and he was too apt to be contented with relieving the present symptoms, instead of tracing them to their origin, and making it his object to remove the cause which produced them. He was a good Latin scholar, and prided himself rather over-much on his skill in composing Latin verses. From being in frequent attendance on the Royal Family, with whom he was a favourite, he had acquired too much of the habits and feelings of a courtier, without that simplicity of mind and sincerity which characterised his predecessor Baillie. Still, he was in many respects an ornament of his profession, and was a worthy representative of it as President of the College of Physicians.

At this time his most successful competitor was my intimate friend (and colleague at St. George's Hospital), Dr. Chambers. He was a thorough gentleman in the best sense of the word; an accomplished scholar, and had been a diligent student in his profession. Although Sir Henry Halford continued to be in attendance on King William, the Queen seemed to prefer Dr. Chambers's straightforwardness to the courtier-like manners of the other. Latterly Chambers was consulted by the King himself, and he was in attendance on his majesty during his last illness, in conjunction with Sir David Davis, the King's domestic physician. From this time Dr. Chambers had the largest share of medical practice in the metropolis, and he well merited the estimation in which he was held by both the public and the members of his own profession. But his physical powers were scarcely equal to the labours which were thus imposed on him. One forenoon, when I was occupied in seeing patients at my own house, he called on me in a state of considerable alarm, having been suddenly affected with a difficulty of articulation. This attack was not of long duration. But it was the first symptom of a disease of the brain, which, though for a long time imperceptible to others, was too plain to those who were intimately acquainted with him, and which caused his death several years afterwards. He had purchased a house with a small estate on the sea-coast in Hampshire, to which, when no longer in a fit state to pursue his profession, he retired, and where he passed the few remaining years of his life. Chambers had an extensive knowledge of his profession, and his great natural sagacity enabled him readily to apply what he knew to the investigation and treatment of the cases which were presented to him. He was altogether an excellent practitioner, but he never ventured to communicate the result of his observations to the public, and thus has left nothing behind him by which he will be known in the next generation. But the same thing may be said of many others. The best part of the knowledge which the ablest practitioners have acquired dies with them; and the rule applies even to those whose names are preserved to us by their written works. It is only a small part of the experience of Sydenham, or Pott, or Hunter, that has been really transmitted to posterity. They may have set up certain landmarks to guide us in our course, but the multitude of smaller details on which success in practice mainly depends are, for the most part, not of a nature to be transmitted in writing.

I had been, from the earliest part of my professional career, in one way or another, so much occupied that I had never found leisure, until after what may be regarded as the middle period of my life, to visit the Continent. In the year 1837 I paid my first visit to Paris, remaining there for a month, having previously made a tour in Normandy with Lady Brodie and our daughter. I had formerly become acquainted with several persons of eminence in that metropolis when they visited London, especially with Cuvier, Orfila, Blainville, Roux, Edwards, Magendie, and Paul Dubois. I had seen Dupuytren only on one occasion, when he came to London to be present at the marriage of one of the family of the Rothschilds. At the time at which I am now writing, the only one of these that remains is Dubois. I was received with great kindness by my former friends and by others whom I had not known before. Since then up to the present time (1857), except in passing through it in my way elsewhere, I have paid only one visit to the French metropolis; and I have been only once in Switzerland, and once in Italy as far as Milan.

As a boy I had read a good deal of both French and Italian, and I have been in the constant habit of reading French ever since. But in the early part of my life there was so little intercourse with foreigners, that the opportunities of conversing with them were of rare occurrence; and when they did occur, after the termination of the long war, I was so entirely occupied by my other pursuits, that I did not avail myself sufficiently of them. The consequence has been that, although I read French as easily as English, I have never acquired the habit of speaking it with facility; and this is probably one reason why I have felt less inclination to travel on the Continent than I should have felt otherwise. It is worthy of notice that formerly the speaking French was far from being a frequent accomplishment. Sir Joseph Banks never conversed with foreigners without the aid of an interpreter, and I have understood that Mr. Canning did not acquire the habit of speaking French until he was, as it were, compelled to do so by becoming the Secretary of State for the Foreign Department.

During the more active period of my professional life I was never absent from London for more than a few weeks in the year. In the year 1828 I engaged a house on Hampstead Heath, which at that time was a comparatively rural retreat. My family resided there during the summer and part of the autumnal season, and I generally was able to go thither to dinner, returning to my occupation in London in the morning. My lease having nearly expired, in the year 1837 I purchased the property which I now have in Surrey, with a larger and more convenient residence. Although I was never confined by illness, except on two or three occasions for a few days at a time, yet I had rarely enjoyed the feeling of being in perfect health. In fact, I was scarcely strong enough for the work which I had to do, and I have little doubt that my health would have failed altogether, if it had not been that my labours were made lighter by the consciousness of success, and that long experience had made me so familiar with the practice of my profession, that few things which were presented to me required any painful effort of mind to enable me to understand them. The time had now arrived when it seemed reasonable that I should consult my own comfort by some relaxation from my former exertions. Although we had lived with little regard to expense, yet the considerable income which my profession afforded me, had enabled me to make such a provision for my family and myself, that I had no further anxiety on this account. I had never been oppressed by the desire to accumulate a fortune, beyond that which was required to prevent my wife and children from *going down in the world* in the event of my being taken from them; and in establishing myself in my new residence in Surrey, I at once determined to retire to it during a considerable part of the summer and autumn, and to extend my vacation annually. To this plan I have faithfully adhered, and I have every reason to be satisfied with the result. Having the advantage of some kind and intelligent neighbours, being visited by some of my early friends, whom I had little opportunity of seeing at other times, and always taking with me some work to be done, either in preparing a new edition of one of my books, or in some other way, I have never experienced any kind of inconvenience from the want of occupation. I have no taste for what are called country pursuits, in shooting or hunting. For some years I tried that of farming, but I was not long enough in the country to take any great interest in it, nor much to understand it; and as I found that it afforded me little amusement to counterbalance the pecuniary loss which it occasioned, I prudently abandoned this new undertaking. I have always devoted a portion of the time which I passed in the country to the renewal of some of the studies of my early life. But if I had trusted to this alone, I am convinced that my new mode of life would not have added to my happiness. It must be confessed that to those who have been long accustomed to the active pursuits of life, and the variety and excitement belonging to them, mere reading and learning is but dull work, and quite insufficient to prevent the miseries of ennui, and the degradation of mind which ennui necessarily produces. . . . . . .

In March 1808 I was elected Assistant-Surgeon to St. George's Hospital. In January 1840, after having filled the place of assistant-surgeon for fourteen years, and that of surgeon for nearly eighteen years, I resigned my office. During these thirty-two years the hospital, as far as my profession was concerned, was the greatest object of interest that I possessed. Except during the brief intervals of my absence from London, it rarely happened that I was not some time during the day within its walls. I was indebted to the opportunities which it afforded me for the best part of the knowledge which I had been able to attain. It had rendered my professional life one of agreeable study, instead of one of mechanical and irksome drudgery. Some of my happiest hours were those during which I was occupied in the wards, with my pupils around me, answering their inquiries, explaining the cases to them at the bedside of the patients, informing them as to the grounds on which I formed my diagnosis, and my reasons for the treatment which I employed, and not concealing from them my oversights and errors—and all this to kind and willing and only too partial listeners. My intercourse with the students, and, I may add, with the patients also, was always to me a source of real gratification; and even now (many years afterwards) these scenes are often renewed to me at night, and events of which I have no recollection when awake come before me in my dreams. It was not without a painful effort that I made up my mind to resign an office to which I had been sincerely attached. In doing so I was influenced by various considerations. One of them was that I began to feel the necessity of diminishing the amount of my labours. Then I had long since formed the resolution that I would not have it said of myself, as I had heard it said of others, that I retained a situation of such importance and responsibility when, either from age or from indifference, I had ceased to be fully equal to the duties belonging to it; and lastly, when I saw intelligent and diligent and otherwise deserving young men around me, waiting their turn to succeed to the hospital appointments, it seemed to me that there was something selfish in standing longer in their way, when, as far as my own mere worldly interests were concerned, I had obtained all that I could desire. I have found no reason to be dissatisfied with the resolution which I had formed, and the step which I took in consequence; yet, for some considerable time after I had taken it, I had many uncomfortable feelings, and I never passed by the hospital without something like a painful recollection that my labours there were at an end. However, I kept up in some degree my connection with it for some years after my resignation, by delivering annually a short course of lectures gratuitously to the students during the winter session, generally selecting for that purpose some one class of diseases, giving a more detailed history of my own experience than it was possible to give in an ordinary course of surgical lectures.

PSYCHOLOGICAL INQUIRIES.

THE FIRST PART.

BEING A SERIES OF ESSAYS INTENDED TO ILLUSTRATE

THE MUTUAL RELATIONS OF THE PHYSICAL ORGANISATION AND THE MENTAL FACULTIES.

This subject, although replete with interest, and of much practical importance, is one as to which we have no means of obtaining such complete and definite knowledge as to admit of it being presented in the shape of a systematic treatise. Some points may be considered as established with a sufficient degree of certainty; there are others as to which opinions may reasonably differ: while there is still a greater number as to which we must be content to acknowledge that, with our limited capacities, we have no means of forming an opinion at all.

The method of dialogue seems to be especially adapted for inquiries of this description; and it is hoped that this will be considered as a sufficient apology for the form in which the following observations are submitted to the public.

In preparing the present and the preceding editions of the 'Psychological Inquiries' for the press, I have taken the opportunity of correcting whatever inaccuracies I had found to exist in the original publication. At the same time I have, in different parts of the work, introduced some new matter, the result of further reflection on the subjects which I have ventured to discuss.

Having received communications from various correspondents, I have not hesitated to avail myself of some of the suggestions which they have offered. There are others which I have not yet sufficiently considered, but of which it is probable that I may be glad to avail myself also, if I should have a future opportunity of doing so.

One of my correspondents seems to be of opinion that I have not sufficiently regarded the dignity of human nature in speaking of the minds of the inferior animals as belonging to the same mode of existence, or being of the same essence, with the mind of man. I do not myself see how anyone, who does not (with Descartes) believe animals to be mere unconscious machines, can arrive at any other conclusion. I do not, however, feel that it is necessary for me to enter further into the question, as it has been fully considered by one of much greater authority than myself; and I have only to refer to the observations on this subject contained in the first chapter of the Rev. Dr. Butler's 'Analogy of Religion to the Constitution and Course of Nature.'

NOTE.—The first edition of *The First Part* of Psychological Inquiries was published (anonymously) in 1854. A second edition appeared in 1855, a third in 1856, and a fourth in 1862, just previous to the author's death, in which year also *The Second Part* was published.—C. H.

PSYCHOLOGICAL INQUIRIES.

THE FIRST PART.

THE FIRST DIALOGUE.

Introduction—Pursuits in Retirement—Limits of Mental Exertion—The Effort of Volition the source of Mental as it is of Bodily Fatigue—The Imagination when we are Awake compared with that during Sleep—Dreams—Analogy of the Poetic Genius to that of Discovery in Science—Sir Isaac Newton's Account of the Process of Discovery in his own Mind—Mental Operations of which we seem to be unconscious—How to be explained—Evils of an ill-regulated Imagination — Fanatics and Impostors — Modern Credulity — Modern Education—Influence of Mathematical Studies—The Faculty of Correct Reasoning a natural Gift rather than one acquired artificially—Self-education—Sir Humphry Davy—Sir Walter Scott—John Hunter—Ferguson the Astronomer—The levelling Influence of a high Education—Advantages which may be expected to arise from the Improvements of Education now in Progress.

The Session of Parliament was drawing to a close. Ministers took advantage of the approach of the grouse-shooting season to hurry through the two houses the various bills which they could not venture to postpone for another year. Some official and professional persons still lingered in the clubs, but the houses in the squares were deserted, and there was an end for some months of what is called *κατ' ἐξοχήν*—London society. Meeting accidentally a friend, whom I shall distinguish by the name of Crites, I expressed my surprise at seeing him still in London. 'Our court,' said he, 'has been sitting later than usual; but I am now emancipated, and I am about to pay a long-promised visit to our friend Eubulus. I know that it would afford him the greatest pleasure if you would accompany me as his visitor.'

Eubulus had been my intimate friend in early life. As boys we had wandered together through our native woods; as young men we had similar pursuits and tastes—had admired the same poetry, and had speculated together on subjects beyond the reach of human wit; but afterwards, being engaged in different professions, and our roads in life lying in different directions, we had parted company, and, as we travelled onwards, had only occasional glimpses of each other. Still, whenever we met, the influence of old associations remained unimpaired; we were as intimate as formerly, and seemed to know more of each other than of any of the friends whom we had acquired at a later period of life.

It was two or three years before the period of which I am now speaking that Eubulus, finding that his health was scarcely equal to the duties of the office which he held, and that, between what he had obtained by inheritance and a retiring pension, he had sufficient fortune to meet the reasonable demands of himself and his family, had gone to reside on a property which he possessed at the distance of a hundred miles from the metropolis; and here he had repeatedly urged me to be his guest. Nothing could be more agreeable to me than the proposal which Crites made; and the result was that, in less than forty-eight hours, we were both seated in a carriage on the railway, and in the course of a few hours more were set down within a mile of our destination.

Our friend's house had been built in the seventeenth century, and, like many country houses of that date, was in a low situation, with a very limited prospect. But this defect was compensated by the beauty of the surrounding country, which exhibited all that variety of picturesque scenery which a varied geological structure usually affords. On one side were steep and lofty chalk hills, covered by a scanty herbage, and dotted with yews and junipers. On another side was a still loftier hill, but of a more gradual elevation, composed of sand with a thin soil over it, and covered with heath, with some clumps of Scotch firs scattered here and there. In the intermediate valley there were fields and meadows, with stubble and green pasture, and intersected by a stream of water; while at the foot of the chalk hills, and at no great distance from the house, there was an extensive beech wood, which, from the absence of underwood, and the magnitude and height of the trees, with their branches mingling above, might be compared to an enormous cathedral, with its columns and arches 'and dim religious light.'

On our arrival we found our friend waiting to receive us, there being no one with him but some of the junior members of his own family, who joined with him in his hospitalities. During the few days which our visit lasted we saw whatever was most worthy to be seen in the surrounding country, walking or riding, and resting at intervals for the purpose of conversation. It seemed at times as if we had gone back to the period of our early life. We expressed ourselves as freely as when we were young, having before us the unknown country which we were about to explore. Still we were sensible that we were not what we had been formerly. The world was no longer that fairy-land which our imagination was wont to furnish with its own images. We knew it and the people in it, and we knew ourselves better than when we began our journey. We had lost the joys of hope and expectation, but we had also lost many of the anxieties which not unfrequently obscured our brighter visions, and years had not rolled over us without leaving us, in the realities of life, many worthy subjects of contemplation.

I have mentioned that Eubulus had quitted his official situation on account of the state of his health; but he had now so far recovered as to have considerable bodily activity, at the same time that he had lost none of his intellectual vigour. It was on the second day of our visit that I expressed to him the satisfaction which it afforded me to find that the experiment which he had made had proved to be so successful. I added, 'It must, indeed, be delightful to you to find yourself here, where everything around you is so cheerful, with every comfort and luxury which you can wish for, and in the enjoyment of that perfect leisure which must facts, or his simple experience, but his previous thoughts, and the conclusions at which he had arrived formerly; and it is only at intervals that he is called upon to make any considerable mental exertion. But at every step in the composition of his philosophical works, Lord Bacon had to think; and no one can be engaged in that which requires a sustained effort of thought for more than a very limited portion of the twenty-four hours. Such an amount of that kind of occupation must have been quite sufficient even for so powerful a mind as that of Lord Bacon. Mental relaxation after severe mental exertion is not less agreeable than bodily repose after bodily labour. A few hours of *bonâ fide* mental labour daily will exhaust the craving for active employment, and will leave the mind in a state in which the subsequent leisure (which is not necessarily mere idleness) will be as agreeable as it would have been irksome and painful otherwise.

Crites. And what limits do you place to mental exertion of the kind to which you allude?

Eubulus. I do not see that it is possible to lay down rules for the mind in that respect, more than for the body; so much must depend on its original powers, on the physical condition of the individual, and on his previous training. Those whose early education has been defective, for the most part, labour under a disadvantage from not having acquired the habit of attention at that period of life when habits are most easily established. A vast effort may be made for a short time. But great things are accomplished more frequently by moderate efforts persevered in, with intervals of relaxation, during a very long period. I have been informed that Cuvier was usually engaged for seven hours daily in his scientific researches; but these were not of a nature to require continuous thought. Sir Walter Scott, if my recollection be accurate, describes himself as having devoted about six hours daily to literary composition, and his mind was then in a state to enjoy some lighter pursuits afterwards. After his misfortunes, however, he allowed himself no relaxation, and there can be little doubt that this over-exertion contributed, as much as the moral suffering which he endured, to the production of the disease of the brain, which ultimately caused his death. Sir David Wilkie found that he was exhausted if employed in his peculiar line of art for more than four or five hours daily; and it is probable that it was to relieve himself from the effects of too great labour that he turned to the easier occupation of portrait painting. In fact, even among the higher grades of mind, there are but a few that are capable of sustained thought repeated day after day for a much longer period than this. For any one who is engaged in intellectual pursuits, there is no more important rule of conduct than that he should endeavour to take a just measure of his own capacity, so that he may not be subject to the ill consequences which arise from the mind being strained beyond its natural powers.

CRITES. I conclude that you use the words *thought* and *thinking* in their more strict sense as implying not simply attention, but also that the mind is actively employed in observing and comparing facts, reasoning on them, and deducing conclusions from them.

EUBULUS. Certainly. I refer to an exercise of the mind beyond that which is required for learning what has already been proved, and following in the steps of those who have gone before us; and this being the case, the explanation of what I have just mentioned is sufficiently obvious. Mere attention is an act of volition. Thinking implies more than this, and a still greater and more constant exercise of volition. It is with the mind as it is with the body. Where the volition is exercised there is fatigue; there is none otherwise: and in proportion as the volition is more exercised, so is the fatigue greater. The muscle of the heart acts sixty or seventy times in a minute, and the muscles of respiration act eighteen or twenty times in a minute, for seventy or eighty, or in some rare instances even for a hundred, successive years; but there is no feeling of fatigue. The same amount of muscular exertion under the influence of volition induces fatigue in a few hours. I am refreshed by a few hours sleep. I believe that I seldom, if ever, sleep without dreaming.

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But in sleep there is a suspension of volition. If there be occasions on which I do not enjoy the full and complete benefit of sleep, it is when my sleep is imperfect; when my dreams are between waking and sleeping, and a certain amount of volition may be supposed to be mixed up with the phantoms of the imagination.

CRITES. But are you right in limiting the capability of the higher kind of intellectual labour in ordinary cases to so low an average as from four to five hours daily? You referred to the instance of Sir Walter Scott; but, if I remember rightly, Sir Walter has a remark in his diary that, 'as to his composition, it was seldom five minutes out of his head during the whole day.'

EUBULUS. This remark was made after his misfortunes, and when it is well known that he was exerting himself beyond his powers. But let us refer to the whole passage. He says, 'If any one asks me what time I take to think of the composition, I might say, in one point of view, it was seldom five minutes out of my head in the whole day; in another, it was never the subject of serious consideration at all, for it never occupied my thoughts for five minutes together except when I was dictating.'*

This brings us to the consideration of another faculty of the mind, a faculty than which there is none more important: in which I will not say that there is no thinking at all, but certainly nothing like intense thought. The imagination is here more at work than the reasoning powers, and it is to this faculty, which in a greater or less degree every one possesses, the child as well as the man, I might even say the idiot as well as the philosopher, that, being properly employed, we owe the greatest contributions of genius to literature and science. As you have already referred to Sir Walter Scott, I will take him for an example. The fictions of the 'Lay of the Last Minstrel,' or of 'Waverley,' cannot be supposed to have been the result of any exercise of volition. They presented themselves to his mind with no more effort than that which precedes the visions of a dream.

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* Diary, February, 1831.

Crites. Then you consider his novels and poems to have been the result of a sort of waking dream?

Eubulus. By no means. In sleep there is an absence of volition. If it be not wholly suspended, it is because the sleep is imperfect. The phantoms of the imagination are never stationary. They succeed each other with such rapidity, that they can never be made the subject of contemplation; and very often there is no connection (that is, none that we can trace) between that which comes first and that which follows. That there really are certain laws which regulate their production, I do not doubt, as there are laws which regulate all the phenomena of the creation; but whatever these laws may be, we know little, and generally nothing, of them. But when awake we have the power of arresting the current of the imagination; we can make the objects which it presents to us the subject of attention; we can view them under different aspects, and thus perceive in them resemblances, relations, and analogies which we could not have perceived otherwise. Hence new objects are presented to us, not at random, but having a certain connection with those by which they were preceded; and from these we can reject one and select another, and go back to that which we had previously rejected. Our minds are so constructed, that we can keep the attention fixed on a particular object until we have, as it were, looked all around it; and the mind that possesses this faculty in the greatest degree of perfection will take cognisance of relations of which another mind has no perception. It is this, much more than any difference in the abstract power of reasoning, which constitutes the vast difference which exists between the minds of different individuals; which distinguishes the far-sighted statesman from the shallow politician; the sagacious and accomplished general from the mere disciplinarian. Such also is the history, not only of the poetic genius, but also of the genius of discovery in science. 'I keep the subject,' said Sir Isaac Newton, 'constantly before me, and wait until the first dawnings open by little and little into a full light.' It was thus that, after long meditation, he was led to the invention of fluxions, and to the anticipation of the modern discovery of the combustibility of the diamond. It was thus that Harvey discovered the circulation of the blood; and that those views were suggested to Davy, which are propounded in the Bakerian lecture of 1806, and which laid the foundation of that grand series of experimental researches which terminated in the decomposition of the earths and alkalis.

Crites. If I understand you rightly, you suppose that the mind, under the circumstances which you mention, is to a great extent in a passive state, objects being presented to it, or conceptions arising in it, which are associated according to certain laws, which differ according to the peculiar structure of individual minds, but which are independent of any direct act of volition; and that the latter is exercised only in keeping the object or conception in view while its various relations gradually unfold themselves to our observation. But it seems to me that on some occasions a still more remarkable process takes place in the mind, which is even more independent of volition than that of which we are speaking; as if there were in the mind a principle of order which operates without our being at the time conscious of it. It has often happened to me to have been occupied by a particular subject of inquiry; to have accumulated a store of facts connected with it; but to have been able to proceed no further. Then, after an interval of time, without any addition to my stock of knowledge, I have found the obscurity and confusion, in which the subject was originally enveloped, to have cleared away; the facts have seemed all to have settled themselves in their right places, and their mutual relations to have become apparent, although I have not been sensible of having made any distinct effort for that purpose.

Eubulus. What you have now described has occurred repeatedly to myself. It is certainly not very easy to comprehend the nature of this mental operation. Is it that the subject every now and then comes before us, and is considered without our recollecting it afterwards?—or is it, as a philosophical friend has suggested, that in the first instance we are perplexed by the multiplicity of facts presented to us, and that after an interval of time those of less importance fade away, while the memory retains those which are essential, in the subsequent arrangement or classification of which, being thus rendered more conspicuous, there is no difficulty?

Crites. The latter seems to be the more probable explanation of the two. At the same time, it must be admitted that they are not incompatible with each other.

Yet we may well doubt whether there be not something more than this. Observe what happens during sleep. However vague and unconnected dreams may be, there is sometimes so much coherence in them, that they are very like realities. You hold a conversation with another person, who, in answer to what you say, uses an argument or makes an observation which you believe to be erroneous, and contradict. This is only one of many examples of the same kind which dreams afford.

Eubulus. With reference to such dreams, Dr. Johnson has somewhere observed that the dreamer must have invented the argument used against himself without being aware that he had done so. This, however, is merely a statement of the fact, and no explanation of it. A late writer, whose mind had in it more of ingenuity than of philosophy, published a thick volume, to prove that each hemisphere of the cerebrum has a separate mind, and that on these occasions the two hemispheres might be considered as conversing with each other.* The work to which I allude, however fantastic it may be, contains many curious illustrations of mental phenomena. But I do not believe the hypothesis, or rather, I should say, that it is not in my nature to believe it. It seems to me that the question as to the oneness and individuality of the mind is very clearly and unanswerably stated by Father Buffier.† It is one of those fundamental truths which are inherent in us, and defy all argument; which I can no more help believing than I can help believing in the external world, or even in my own existence.

Crites. The subject of dreams is one of great interest, and I shall be glad if we can have the opportunity of discussing it hereafter. At present, I would rather revert to a former part of our conversation.

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* On the Duality of the Mind, by A. L. Wigan, M.D., 1844.

† Traité des Premières Vérités. Deuxième partie, ch. 10.

Admitting all that you say as to the advantage of contemplative habits, still you surely do not mean to assert that these are more important than the capability of forming a right judgment of the thing before us, and of reasoning accurately.

Eubulus. Certainly not. But neither do I doubt that in all cases in which we have to arrive at a conclusion by comparing the evidence on one side with that on the other (and these include all branches of human knowledge except pure mathematics), nothing contributes so much to accurate reasoning as the habits of which we are speaking. The principal defect in those who reason inaccurately is that so happily illustrated by the fable of the two knights disputing about the gold and silver shield. They do not see, or they do not take into the account, the whole of the facts on which their conclusion is to be founded. Who is so little liable to fall into this error as the individual who keeps the subject to which his inquiries are directed constantly before him, until all its relations gradually are presented to his view? Observe, that I am speaking of a well-regulated imagination, which is not led astray by prejudice or passion, or fanciful analogies. The ill-regulated imagination of inferior minds is quite a different matter, and produces nothing but enthusiasts, fanatics, and, I may add, impostors.

Crites. But, unfortunately, it is these last classes of persons who, by means of their activity and earnestness, are often the most influential in the world. A fanatical monk persuaded the whole of Christendom to embark in the wild scheme of the Crusades. Lord George Gordon, a crazy fanatic, led the London mob to burn down Newgate, and nearly to involve the whole of the metropolis in the conflagration. It is not long since no small number of persons, and not merely those belonging to the uneducated classes, were led to believe that a dropsical old woman was about to be the mother of the real Shiloh; and, even at the present day, many thousand Mormonites attest their belief in the divine mission of a half-madman and half-impostor, in the person of Joe Smith. How many similar histories may be furnished by any one who studies the past history of the human race!

Eubulus. I am afraid that we need not go so far back as the age of the Crusades, nor refer to the disciples of Joanna Southcote, or the Mormonites, for instances of such credulity on the part of a considerable portion of mankind. We have, indeed, discarded our faith in astrology and witches: we pity the ignorance of the poor African, who, in a season of drought, seeks the conjurations of the rainmaker; we cannot well comprehend how it was that the civilised Athenians of the third century should have believed that marble statues would feel themselves to be offended, and show their displeasure by leaving their pedestals and walking about at night.* Nevertheless, with all our boasted wisdom, and all our advance in knowledge, there are at the present day many who believe in things not supported by better evidence than these. There are epidemics of opinion as well as of disease, and they prevail at least as much among the well-educated as among the uneducated classes of society. The energy and sincerity of enthusiasts is powerful in all ages, and carries with it the conviction of that large portion of mankind who do not inquire and think for themselves. It is, indeed, a melancholy fact, that a great extension of education and knowledge does not produce any corresponding improvement in this respect. Still, in the end, good sense prevails. Errors and deceptions last only for a time. Those which disgrace one age vanish, and are succeeded by those which disgrace the next. But a truth once established remains undisputed, and society, on the whole, advances.

Crites. But does not what you have now stated tend to show that there is some defect in modern education? Might it not do more than it does towards the improvement of the reasoning faculty?

Eubulus. I doubt it. Education does a great deal. It imparts knowledge, and gives the individual worthy objects of contemplation for the remainder of his life. It strengthens his power of attention; and such is especially the case with the study of mathematics; and in doing so it cannot fail, to a certain extent, to assist the judgment. Still it seems to me, that to reason well is the result of an instinct originally implanted in us, rather than of instruction; and that a child or a peasant reasons quite as accurately on the thing before him and within the sphere of his knowledge, as those who have gone deep into the study of logic as a science. With regard even to mathematics, I much doubt whether they tend to improve the judgment on those subjects to which they are not immediately applicable. Dugald Stewart makes the following observation:—'In the course of my own experience, I have never met with a *mere* mathematician who was not credulous to a fault, not only with respect to human testimony, but credulous also in matters of opinion, and prone on all subjects, which he had not carefully studied, to repose too much faith in illustrious and consecrated names.'* Nor is this at all difficult to explain. The principal errors of reasoning, on all subjects beyond the pale of the exact sciences, arise from our looking only on one side, or too exclusively on one side, of the question. But in mathematics there is no alternative. They have nothing to do with degrees of probability. The truth can be on one side only, and we arrive at a conclusion about which there is no possibility of doubt, or at none at all. In making these observations, however, do not suppose that I do not sufficiently estimate this most marvellous science, which, from the simplest data, has been made to grow up into what it now is by the mere force of the human intellect, the truths of which would have been the same if heaven and earth had never existed, would be the same still if they were now to pass away, and by means of which those branches of knowledge to which it is applicable have been brought to a state of perfection which others can never be expected to attain.

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* Lucian in Philopseudes.

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* Moral Philosophy, 4th edition, 1827, vol. iii. p. 280.

ERGATES. It certainly seems to me, as it does to Eubulus, that the faculty of reasoning correctly (or what is commonly called having a clear head) is for the most part a natural gift, and that it admits of being artificially improved only in a limited degree. Indeed, it admits of a question whether modern education, instead of doing too little, does not, on the whole, err on the side of attempting to do too much? Sir Humphry Davy, when a boy, was placed under a schoolmaster who neglected his duties; and, adverting to this subject in a letter addressed to his mother after he was settled in London, he says, 'I consider it as fortunate that I was left much to myself as a child, and put on no particular plan of study, and that I enjoyed much idleness at Mr. Coryton's school. I, perhaps, owe to these circumstances the little talents I have, and their peculiar application. What I am I made myself. I say this without vanity, and in pure simplicity of heart.'[*] John Hunter, who, in the department of science, is one of the most remarkable individuals whom this country has produced, had applied very little to study of any kind until he came to London, and began that of anatomy, under his brother William. Like Davy, he was distinguished for his perseverance, the originality and comprehensiveness of his views, and the clearness of his intellect. Would not these faculties have been cramped and deranged, rather than improved, by a more systematic education?

EUBULUS. In accordance with your view of the matter, Sir Walter Scott has somewhere observed, that 'the best part of every man's education is that which he gives himself;' and I willingly admit that, among those whose intellect is of the higher order, there are many who would ultimately accomplish greater things if in early life they were left more to their own meditations and inventions than is the case among the more highly educated classes of the community.[†] Ferguson, the astronomer and mechanical philosopher, told Dugald Stewart that 'he had more than once attempted to study the "Elements of Euclid," but found himself quite incapable of entering into that species of reasoning. He satisfied himself of the truth of the various geometrical propositions of which he had daily occasion to make use by means of compasses and other mechanical contrivances.'* It is well known that Ferguson had little or no education. If it had been otherwise, it is more than merely probable that he would have been held to be a dunce, and that the peculiar talent by which he acquired his reputation would have been crushed or wasted. A high education is a leveller, which, while it tends to improve ordinary minds, and to turn idleness into industry, may, in some instances, have the effect of preventing the full expansion of genius. The great amount of acquirement rendered necessary by the higher class of examinations as they are now conducted, not only in the universities, but in some other institutions, while it strengthens the power of learning, is by no means favourable to the higher faculty of reflection. Wisdom is not the necessary result of knowledge, nor are great things to be accomplished except by those who, without neglecting what may be acquired in other ways, trust mainly to their own observation, and think and reason for themselves on the subjects which come before them. For minds of a higher order, it might be better that examinations were dispensed with altogether. But it must be borne in mind, that in this world none of our schemes are perfect, and that in all human affairs we must be content to do that which is best on the whole. Geniuses are rare exceptions to the general rule; and a mode of education which might be well adapted to the few who think for themselves would be ruinous to the unreflecting majority. As to making one system of education for one class of minds, and another for another, there are, if I may be allowed to use a metaphorical expression, mechanical difficulties in the way. Besides, who is to know what a boy's mind is, or what is his peculiar turn, until the greater part of his education is completed?

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[*] Memoir, by John Davy, M.D., vol. i. chap. 1.

[†] See Additional Note A, page 246.

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* Stewart's Moral Philosophy, 1814, vol. ii. p. 196.

Crites. I agree with you to a great extent, but not altogether.

> 'Est quâdam prodire tenus si non datur ultra.'

I apprehend that the changes as to education, which are now in progress in this country, of which the principal result will be the introduction of new branches of study into our schools and colleges, will do much towards remedying the defects of the present system. Those who have it not in their power to excel in one thing will find that they may, nevertheless, excel in another; and each individual will naturally, and almost unconsciously, direct his attention to those subjects which are most congenial to his taste, and best adapted to the peculiar structure of his mind.

THE SECOND DIALOGUE.

Mind and Matter—Natural Theology—Views of Sir Isaac Newton—Reasons for regarding the Mental Principle as distinct from Organisation—The Influence of the one on the other not sufficiently regarded by Metaphysicians—Relations of the Nervous System to the Mental Faculties—Speculations of Hooke, Hartley, &c.—The Brain not a single Organ, but a Congeries of Organs cooperating to one Purpose—Physiological Researches of Magendie and Flourens—The different Capacities of Individuals for the Perception of Colours, Musical Sounds, &c., probably dependent on different Organisation of the Brain—Supposed Connection of the Cerebellum with Locomotion—Is there an Organ of Speech?—Instances of Want of Speech in those who were neither Deaf nor Idiotic—Stammering—Memory—Dr. Hooke's Speculations—Affections of the Memory from Cerebral Disease or Injury—Impressions on the Brain not sufficient for Memory, unless accompanied by Attention, which is an Act of the Mind itself—The Nature of the Physical Changes which occur in connection with the Memory beyond the reach of our Observation and Capacities.

It was on the day following that of the foregoing discussion that our friend invited us to accompany him to a spot in the neighbourhood which, from its greater elevation, afforded an extensive panoramic view of the whole of the surrounding country. Our road was by an easy ascent; the weather was fine; and, as we proceeded leisurely, we were able to combine the pleasures of conversation with those of breathing the fresh air and admiring the beauties of the scenery. When we had reached the summit of the hill, we were amply rewarded for the trouble of ascending it. It was one of those days which so frequently precede a fall of rain, when the transparency of the atmosphere renders distant objects unusually distinct, and apparently less distant than they really are. For twenty-five or thirty miles on every side, the country lay before us, with its woods and meadows, villages and churches, as plain as if they had been represented on a map. The sun was at this time about two hours above the horizon, his beams being occasionally intercepted by some light clouds, the shadows of which sometimes fell on ourselves, and at other times were seen rapidly traversing the landscape below. A slender moon, not more than three days old, was seen following the sun towards the west.

'I never,' said Eubulus, 'find myself left to my own contemplations in a situation such as this without a feeling of wonder at myself and my own existence. Here am I, I mean I, who feel and think, pent up within the narrow dwelling of my own body, yet taking cognisance of things remote in space, not only of those which belong to our own world, but of those in the vast universe around us. Marvellous as this may be, let us wait but for a few hours, and we have what is still more marvellous. By the aid of a tube and a few glasses, I may become acquainted with other objects, suns and worlds, distant from us not only in space, but also in time, which I see not as they now are, but as they were many thousands of years before I myself was in existence. I do not say that such reflections prove more than may be proved in other ways, but they certainly impress my mind more strongly with the conviction that, as a percipient, conscious, and intelligent being, I belong to a mode of existence wholly different from that of the senseless bodies by which I am surrounded, and that (even independently of the evidence afforded by revelation) there is nothing unreasonable in the universal expectation of mankind (so universal, indeed, that it may well be regarded as an instinct) that there is something in us which will remain, and be capable of perception and thought, and it may be of pure and high aspirations, when the gross material fabric with which it is now associated has become resolved into its original elements.'

CRITES. I can perfectly enter into the sentiments which you have now expressed. The properties of mind are so wholly different from those of matter, the two are so completely asunder, that they do not admit even of the most distant comparison with each other. I can easily imagine that motion, gravitation, heat, light, electricity, magnetism, chemical attraction, have something in common; that they are (as, indeed, Mr. Grove has shown them to be) so far of the same essence as to be convertible into each other; but it is to me wholly inconceivable that any exaltation of the known properties of matter should produce the conscious indivisible monad which I feel myself to be. When the materialist argues that we know nothing of mind except as being dependent on material organisation, I turn his argument against himself, and say that the existence of my own mind is the only thing of which I have any positive and actual knowledge. I cannot help believing in the existence of an external world. Still the hypothesis of its non-existence implies no contradiction; whereas it is as much a contradiction to doubt the existence of my own mind as it would be to doubt that two and two are equal to four. You must excuse me, however, if I say that it occurred to me yesterday (though I did not notice it at the time) that in one of your remarks, you seemed to identify the functions of the mind with those of the body more than you are disposed to identify them at present. I allude to the comparison which you made of the effect produced by long-continued voluntary effort in the maintenance of muscular contraction, and in the operations of the intellect.

EUBULUS. When we say that we believe in the independent existence of the percipient and thinking principle, I apprehend that neither you nor I can mean to deny the obvious fact of it having a connection with our bodily organs, by means of which it receives impressions from without, and operates in return on bodies external to itself.* This, however, is not peculiar to such humble beings as ourselves. When I contemplate the order, intention, and design displayed everywhere around us, but which, to our limited comprehensions, is more especially manifested in the vegetable and animal creations, I cannot avoid attributing the construction and order of the universe to an intelligent being, whose power and knowledge are such that it is impossible for me to form any adequate conception of them, any more than I can avoid referring the motions of the planets and stars to the same law of gravitation as that which directs the motions of our own globe. But no one, I apprehend, will maintain that the mind of the Deity depends on a certain construction of brain and nerves; and Dr. Priestley,* the most philosophical of the advocates of the system of materialism, ventures no further than to say that we have no knowledge on the subject. But, to use the words of Sir Isaac Newton, 'This powerful ever-living agent being in all places, is more able to move the bodies within his boundless uniform sensorium, and thereby to form and reform the parts of the universe, than we are, by our will, to move the parts of our own bodies.' The remainder of the passage from which I have made this quotation, is not without interest, as indicating the view which Newton took of the matter in question:—'And yet we are not to consider the world as the body of God, or the several parts thereof as the parts of God. He is a uniform being, void of organs, members, or parts, and they are his creatures, subordinate to him and subservient to him, and he is no more the soul of them than the soul of man is the soul of the species carried through the organs of sense into the place of its sensation, where it perceives them by its immediate presence, without the intervention of any third thing. The organs of sense are not for enabling the soul to perceive the species of things in its sensorium, but only for conveying them thither; and God has no need of any such organs, he being everywhere present to the things themselves.'†

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* See Additional Note B, page 247.

ERGATES. I entirely agree with you in the opinion that we must admit the existence of the Deity as a fact as well established as that of the law of gravitation, and that in doing so we must further admit that mind may and does exist, independently of bodily organisation. Be it also remembered that *mind*, in its humblest form, is still *mind*, and that, immeasurable as the distance between them may be, it must nevertheless be regarded as being of the same essence with that of the Deity himself. For my own part I find no difficulty in conceiving the existence of mind independently of corporeal organs. But our actual experience of the human mind is only as we find it in this combination, and in no other way can it be the proper object of study. It seems to me that the best writers on mental philosophy have erred in considering the mind too abstractedly, and in not taking sufficiently into the account the physical influences to which it is subjected.

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* Priestley, Disquisitions on Matter and Spirit, sect. 9.

† Optics, book iii. p. 349, 4th edition.

Eubulus. There are, however, those who form an exception to this rule: for example, Descartes, Hartley, and that universal genius Dr. Hooke. Moreover, Dr. Reid's inquiry into the human mind is founded on a critical examination of the several senses; and Dr. Berkley's essay on the corporeal function of vision contains the germ of all his metaphysical investigations.

Crites. You might have included the mystical speculations of Unzer and some other German writers. Reid and Berkley were certainly as far as possible from being materialists. The others, without one exception, have been guilty of an error the very opposite to that which I have mentioned, giving as an explanation of mental phenomena that which not only has no foundation in observation and experience, but which is, indeed, no explanation at all. When I learn from Hartley that thought is a vibration of the fibres of the brain; and from Hooke that there is a matter in the brain intended to receive the impressions of sound, which may be compared to the bells and vases which Vitruvius describes as being placed in the ancient theatres;* and that thinking is the radiation of the soul from one part of the brain to another, I do not find myself to be a whit wiser than I was before.

Eubulus. That may be true. But when Hooke states that there are various structures in the brain adapting it for the part which it has to perform in connection with the mental principle —that there is an organ of memory, for example—I find so many facts which are favourable to this opinion, that I cannot but regard it as more than a mere hypothesis. As to this point, however, Ergates has had greater opportunities than I have had of obtaining information; and I should be well pleased to hear what he has to say on the subject.

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* Posthumous Works—Lectures on Light, sect. 7.

Ergates. If I comply with your wishes, I must make some small demand on your patience, as, although what I have to say may not be much in substance, it cannot be compressed into a very few words.

We may safely assume, as an established fact, that it is only through the instrumentality of the central parts of the nervous system that the mind maintains its communication with the external world. The eye is necessary to sight, and the ear to hearing; and so with the other organs of sense. But the eye does not see, and the ear does not hear; and if the nerve which forms the communication between any one organ of sense and the brain be divided, the corresponding sense is destroyed. In like manner it is from the brain that all those impulses proceed by which the mind influences the phenomena of the external world. The division of the nerves which extend from the brain to the larynx destroys the voice. The division of the nerves of a limb causes the muscles of the limb to be paralysed, or, in other words, withdraws them from the influence of the will; and the division of the spinal chord destroys at once the sensibility and the power of voluntary motion in all the parts below that at which the division has been made.

If we investigate the condition of the various orders of vertebrate animals, which alone admit of a comparison with our own species, we find, on the one hand, great differences among them with regard to both their physical and mental faculties; and on the other hand, a not less marked difference as to the structure of their brain. In all of them the brain has a central organ, which is a continuation of the spinal chord, and to which anatomists have given the name of *medulla oblongata*. In connection with this there are other bodies placed in pairs, of a small size and simple structure, in the lowest species of fish, becoming gradually larger and more complex as we trace them through the other classes, until they reach their greatest degree of development in man himself. That each of these bodies has its peculiar functions there cannot, I apprehend, be the smallest doubt; and it is, indeed, sufficiently probable that each of them is not a single organ, but a congeries of organs, having distinct and separate uses. Experimental physiology, joined with the observation of the changes produced by disease, has thrown some light on this mysterious subject. There is reason to believe that, whatever it may do besides, one office of the *cerebellum* is to combine the action of the voluntary muscles for the purpose of locomotion. The *corpora quadrigemina* are four tubercles, which connect the *cerebrum*, *cerebellum*, and *medulla oblongata* to each other. If one of the uppermost of these bodies be removed, blindness of the eye of the opposite side is the consequence. If the upper part of the *cerebrum* be removed, the animal becomes blind, and apparently stupefied, but not so much so but that he may be roused, and that he can then walk with steadiness and precision. The most important part of the whole brain seems to be one particular part of the central organ, or *medulla oblongata*. While this remains entire, the animal retains its sensibility, breathes, and performs instinctive motions. But if this very minute portion of the nervous system be injured, there is an end of these several functions, and death immediately ensues. These facts, and some others of the same kind, for a knowledge of which we are indebted to modern physiologists, and more especially to M. Magendie and M. Flourens, are satisfactory as far as they go, and warrant the conclusion that there are various other organs in the brain, designed for other purposes, and that if we cannot point out their locality, it is not because such organs do not exist, but because our means of research into so intricate a matter are very limited.

Crites. Granting your proposition, and not denying that there may be original differences in the mental principle itself, we perceive to how great an extent the propensities and characters of individuals may depend on their physical organisation. One person, for instance, may have a nicer perception of colours than another in consequence of the organ by which colours are distinguished being in the one more, and in the other less, developed.

Ergates. Or the organ may be so imperfect that the perception of colours may be in a great degree, and as to some colours entirely, wanting. In fact, examples of this imperfection are not very uncommon. There are some persons who are incapable of recognising the difference of colours which appear quite different to ordinary observers, and who are especially liable to confound the two complementary colours of red and green with each other, so that where a scarlet cloth is laid out on the green turf they perceive no difference between them. The great difference which exists in different individuals as to the perception of musical sounds, or the power of numerical calculation, is best explained by attributing it to a difference of organisation; and it is probable that the imperfection or absence of other faculties which we occasionally meet with is to be explained in the same manner. For example, if there be a part of the brain whose office it is to combine the action of muscles for the purpose of locomotion, it is a fair conclusion that there is some other part of it answering the same purpose as to the muscles of speech; an organ which, if not peculiar to them, is most complete and perfect in the human race, the '*μέροπες ἄνθρωποι.*'

Crites. If so, an imperfection or absence of this organ should be a cause of dumbness. But I have understood that dumb persons are either those who are congenitally deaf, so that they cannot hear the sounds which they are required to imitate, or those who are idiotic, and deficient in other faculties as well as in this.

Ergates. What you have stated is undoubtedly the general rule. There are, however, cases of incapability of articulate speech which cannot be referred to either of these categories. There are individuals who, having suffered from disease of the brain, are unable to express their thoughts by speech, although, their faculties being little or not at all impaired otherwise, they have a perfect comprehension of what others say, and of what they wish to say themselves. Some of them can utter a few words, others none at all, and others again, when intending to say one word, use another. There are other cases still more remarkable, the facts of which may well lead us to believe that the organ of speech, if not originally and congenitally wanting, has been at any rate from the beginning so imperfect as to be useless. Two examples of what I have now mentioned have come under my own observation. Several years ago, I saw a little boy, then about five years old, whose faculty of speech was limited to the use of the word *papa*. This, it may be observed, is so simple a sound, that dolls are made, by some very simple mechanism, to produce it very distinctly. I soon ascertained that his sense of hearing was perfect, and that there was nothing peculiar in the formation of the soft palate, mouth, and lips. There was no want of inclination to speak, but in the attempt to do so he produced sounds which were wholly inarticulate. So far was he from being deficient as to his powers of apprehension, that he seemed to be even beyond what children of the same age generally are in this respect. Although he could not speak himself, he understood perfectly what was said to him by others, and expressed his answers by signs and gestures, spelling with counters monosyllabic words which he was incapable of uttering. I should add, that the external senses and powers of locomotion were perfect, and that all the animal functions were properly performed. The only other sign of disease or imperfection of the nervous system was that, for two or three years before I saw him, the boy had been subject to fits or nervous attacks, attended with convulsions, but which (as I was informed) his medical attendant in the country regarded as having the character of hysteria rather than that of epilepsy.

I have had no other opportunity of making my own observations on the case; but eight years afterwards, I was informed, on good authority, that the boy was still unable to speak, though he had made much progress otherwise; and that, among other acquisitions, he wrote beautifully, and was very clever in arithmetic.

The other case to which I have referred was that of a girl, who, at the time of my seeing her, was eleven years of age. She had no faculty of speech, uttering merely a few inarticulate sounds, which her parents in some degree understood, but which were wholly unintelligible to others. It was easily ascertained that her sense of hearing was perfect, and that there was no defect in the formation of the external organs. After a careful examination, I was satisfied that the parents were correct in saying that she comprehended all that was said to her. She was perfectly tractable and obedient, and did not differ, either in her appearance or as to her general behaviour, from other intelligent children. Being in an humble sphere of life, it seemed that very little trouble had been taken with her education; still, when I placed before her a book which she had never seen before, and desired her to point out different letters, she did so with readiness and accuracy, making no mistakes. She had never suffered from fits of any kind, nor were there any indications of cerebral disease, or other physical imperfection. Her parents said that from her earliest age she had been as she was when I saw her, equally intelligent, but incapable of speech.

EUBULUS. The facts which you mention are very interesting; and it seems to me that they throw light on at least some cases of stammering, in which we may suppose that the organ of speech is more or less imperfect, although it may be not altogether wanting. But let us go back to Dr. Hooke: he says—'I suppose memory to be as much an organ as the eye, ear, or nose, and to have its situation (in the brain) somewhere near the place where the nerves from the other senses concur and meet.' He then goes on to explain in detail, that the soul, or first principle of life, though it be an incorporeal being, yet in performing its actions, makes use of corporeal organs; that in the brain there is a repository of impressions made by the senses for the purpose of memory; but that no idea can be stored up in this repository without the directing power of the soul, and that this act of the soul is what is called attention.

Ergates. I am not prepared to admit, nor is it worth while to discuss, the explanation which Hooke has given of what goes on in the brain in connection with the memory, and other mental processes, it being for the most part fantastical, and unworthy of so great a philosopher; but that he and others are correct in regarding memory as being in some way connected with our physical organisation, there can be, I conceive, not the smallest doubt.

The eye, the ear, and the other organs of sense, are physical instruments by means of which impressions are communicated through the nerves to the brain. Without this apparatus, in our present state of existence, there would be no sensations; no knowledge of any thing external to ourselves. It does not, however, follow that the brain itself feels, or that it performs any other than a subordinate office, conveying the impressions received from the organs of sense to a superior principle in connection with it. Memory is a recurrence of sensations, which existed formerly, produced by the operation of some internal changes, after the causes, by which the first sensations were excited, have ceased to exist. These renewed sensations are (with some rare exceptions) fainter and less distinct than those in which they originated. There is also this difference between them, that the renewed sensations are subject to the influence of volition, vanishing at once on the slightest effort being made to direct the attention to anything else; whereas we have no such power over the impressions which are made on our senses by the immediate presence of external objects. Notwithstanding these points of difference, it is plain that memory is closely allied to sensation, and the resemblance between the two orders of phenomena is so great as to justify the suspicion that the nervous system is instrumental in producing the one as well as the other; while a multitude of facts show that the suspicion is well founded. A blow on the head may destroy the memory altogether, or (which is more usual) it may destroy it partially, or it may interrupt its exercise for a certain time, after which it may be gradually, or even suddenly, restored. After fever, also, and some other bodily ailments, the memory is not unfrequently impaired or lost. A gentleman found that he had lost the power of vision in one eye. Then he regained it partially in that eye, but lost it in the other. Afterwards he partially regained it in the eye last affected. He could now see objects when placed in certain positions, so that the image might fall on particular parts of the retina, while he was still unable to see them in other positions. These facts sufficiently proved the existence of some actual disease. But observe what happened besides. His memory was affected as well as his sense of sight. Although in looking at a book he recognised the letters of the alphabet, he forgot what they spelled, and was under the necessity of learning again to read. Nevertheless, he knew his family and friends; and his judgment, when the facts were clear in his mind, was perfect.

In another case, a gentleman who had two years previously suffered from a stroke of apoplexy (but recovered from it afterwards) was suddenly deprived of sensation on one side of his body. At the same time he lost the power, not only of expressing himself in intelligible language, but also that of comprehending what was said to him by others. He spoke what might be called *gibberish*, and it seemed to him that his friends spoke *gibberish* in return. But while his memory as to oral language was thus affected, as to written language it was not affected at all. If a letter was read to him, it conveyed no ideas to his mind; but when he had it in his own hand, and read it himself, he understood it perfectly. After some time he recovered of this attack, as he had done of that of apoplexy formerly. He had another similar attack afterwards.

A blow on the head which causes insensibility generally affects the memory so far that when the patient has recovered from the state of insensibility he has no knowledge of the accident. But in some instances the effect of a blow on the head is merely to disturb the memory, the other functions being unimpaired. A groom in the service of the Prince Regent was cleaning one of some horses sent as a present to His Royal Highness by the Shah of Persia. It was a vicious animal, and he kicked the groom on the head. The groom did not fall, nor was he at all stunned or insensible; but he entirely forgot what he had been doing at the moment when the blow was inflicted. There was an interval of time, as it were, blotted out of his recollection. Not being able to account for it, he supposed that he had been asleep, and said so to his fellow-servant, observing at the same time 'that he must set to work to clean the horse, which he had neglected to clean in consequence of his having fallen asleep.'

In other cases the effect of a blow on the head has been not only to erase from the memory the events which immediately preceded the accident, but also to prevent it retaining the impression of those which occurred immediately afterwards. A young man was thrown from his horse in hunting. He was stunned, but only for a few minutes; then recovered, and rode home in company with his friends, twelve or thirteen miles, talking with them as usual. On the following day he had forgotten not only the accident itself, but all that happened during his journey home.

It would be easy to multiply examples such as these, both from my own experience and from the observations of others; and from them it seems to be a legitimate conclusion that the nervous system is instrumental in producing the phenomena of memory as well as those of sensation. They show also that it is not in every part of the nervous system, but in the brain, that memory resides. This faculty is injured by a blow on the head, or a disease affecting the brain; but not by an injury of the spine, or a disease of the spinal cord. The eyes may be amaurotic; but Milton and Huber retained the memory of objects which they had seen previously to their blindness. It is not the spinal cord, nor the nerves, nor the eye, nor the ear, but the brain, which is the storehouse of past sensations, by referring to which the mind is enabled to renew its acquaintance with events which are passed, and at the same time to obtain the means of anticipating, to a great extent, the events which are to come.

Crites. Your view of the matter then seems to be that impressions made on the organs of sense, and transmitted to the brain, produce some actual change in the minute organisation of the latter, and that this is subservient, and in our present state of existence essential to, the memory.

Ergates. I do not see how the facts which I have mentioned, and a hundred others which I might mention, can be otherwise explained. What the actual changes in the condition of the brain may be, it is impossible for us to comprehend. Yet it is in no degree remarkable that such changes should take place. We see a tree which has been exposed for centuries to the heat of summer, and the cold of winter, and the influence of the winds and tempests. Every change of temperature, every gust of wind, every storm of rain or hail, and probably even every change in the electric condition of the atmosphere, must have left its mark behind by producing some slight alteration in its root, and trunk, and branches. We recognise only the general result, when we see the aged tree, with its fissured bark, and its branches inclined to that side from which it has been the least assailed by the wind. But a being of superior knowledge, and possessed of the faculties necessary for more minute and accurate observation, would be able to distinguish the effect of every individual impression made by the operation of the causes which have been enumerated, and of others more obscure.

In offering these remarks, however, let me not be misapprehended as giving our knowledge for more than it is actually worth, or as pretending to understand more than we understand in reality. In our present state of existence, as the eye, the ear, the touch, and the other organs of sense, and, I may add, the action of our muscles, are the means by which we obtain a knowledge of things external to ourselves; so it would appear that the organisation of the brain is made subservient to the function of memory. As to what there may be besides, or what may be the capabilities of the mental principle, independently of organisation; or how much may belong to the one, and how much to the other; I do not pretend to offer an opinion. Here, as in other matters belonging to this order of inquiries, we may be sure that our actual knowledge goes very little way. 'We see these things through a glass darkly,' and must be content humbly to acknowledge that the greater part is not only beyond the limits of our observation, but probably beyond those of our comprehension.

There is, however, one other point which is not beyond the reach of our capacities, and which ought not to be left unnoticed. It is clearly not sufficient that an impression should be transmitted to the brain for it to be remembered. An act of the mind itself is necessary for that purpose; and that, as Dr. Hooke has observed, is the act of attention. It is only a small proportion of what we see, or hear, or feel, or imagine, that is not immediately forgotten, simply because there are very few of these things to which we pay more than a momentary attention, while to many of them we pay no attention at all. Now, as Eubulus explained to us on a former occasion, attention implies volition; that is, it is that effort of volition by which an object, which would otherwise have immediately passed away, is kept present to the mind during a certain period of time. Sensation and volition are the two functions by means of which the mental principle is enabled to maintain its communication with the external world. It is under the influence of volition that the contraction of muscles takes place for locomotion, speech, the procuring of food, and other purposes, and that the torpedo discharges his electric battery. Here there is an impulse communicated from the mind to the brain, from thence to the nerves, and from these to other organs, and producing a marked change in the condition of the latter; and, *à priori*, there is no reason to doubt that the operation of a similar cause may produce an equal change, though of another kind, and more permanent, in the minute structure of the brain itself.

Crites. If these views be correct, and if your speculation also be correct as to the existence of special organs in the brain for the purposes of locomotion and speech, it would appear probable that there is a special organ for that of memory also.

ERGATES. That is true. But there our knowledge ends. We may, I suppose, take it for granted that there is no animal whose memory is equally capacious with that of man; and we know that, with the exception perhaps of the dolphin (of whose faculties we know nothing), there is no other animal in whom that portion of the cerebrum which we call its hemispheres, and which are bounded externally by the convolutions, is equally developed. It may be said, and not without some show of reason—'Do not these facts seem to indicate where the faculty of memory resides?' Willis answered the question in the affirmative.* But observe how it is in birds. In them there are no convolutions; and the only part of the brain which can be said to correspond to the cerebral hemispheres of man, is merely a thin layer of cerebral substance expanded over some other structures which are developed to an enormous size. Yet we know that birds which are domesticated exhibit signs of considerable memory, parrots and cockatoos recognising individuals after a long interval of time; and that birds in their natural state return to their old haunts after their annual migrations. The exploits of the carrier-pigeons cannot be explained without attributing to them no small powers of observation, and of recollecting what they had observed. Perhaps future observations on the effects produced by disease of the brain in connection with affections of the memory may throw some light on this mysterious subject. At present we must be content to acknowledge that we know nothing as to the locality of the function, nor of the minute changes of organisation which are connected with it.

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* 'Multiplices cerebri plicæ et convolutiones requiruntur, nempe ut in istis, tanquam in diversis cellulis et apothecis, sensibilium species reservari, atque illinc pro datâ occasione evocari queant.'—Willis *de Anatome Cerebri*, cap. 10.

THE THIRD DIALOGUE.

The Subject of Memory continued—Sequence and Association of Ideas—Suggestion of Ideas by internal Causes acting on the Brain by the Nerves, or through the Medium of the Blood—Influence of Narcotics, Morbid Poisons, Lithic Acid, Impure Atmosphere, and other Physical Agents on the Condition of the Mind—Such Inquiries not only of scientific Interest, but also of practical Importance—Physical Causes of Mental Illusions—Examples of false Perceptions referred to the Sight and other Senses—Other forms of Illusion more frequent in Cases of Mental Aberration than mere Deceptions of the External Senses—Mr. Locke's Definition of Insanity not sufficiently comprehensive—A too rapid Succession of Ideas, with Incapability of fixing the Attention, incompatible with correct Reasoning—State of Mind in the so-called 'Moral Insanity'—Question as to the Limits of Moral Responsibility.

The conclusion of our journey had somewhat abruptly terminated our conversation. When we were assembled in the evening, the subject of it was thus resumed by Eubulus.

Eubulus. Although some of the opinions which Ergates expressed this afternoon may be regarded as hypothetical, and not admitting of actual and positive proof, yet it must be owned that they are supported by many facts, and by some in addition to those which he has himself adduced. Especially his views as to the nature of memory seem to afford an explanation of some circumstances relating to the connection of the mind with the body, which cannot well be explained otherwise.

For instance: we remember nothing of what occurred in infancy. That part of our life seems afterwards to be a blank in our existence; and it is not unreasonable to suppose that the brain, like some other of the organs of the newly born child, is in an unfinished state, and, therefore, not fitted to retain the impressions made on it during any considerable period of time.

Then the impressions made on the memory gradually become fainter and fainter as time elapses; and this is in accordance with the gradual alteration which our physical structure undergoes as we advance in life. If there be exceptions to the rule, they are such as tend to prove the rule itself. For example, where the recollection of an event which occurred long ago is unusually vivid, we say, 'it seems as if it had happened only yesterday,' and, on the other hand, when the recollection of an event which occurred only lately is unusually faint, it appears to us at first that it happened long ago; and it is only after some consideration, and by referring to some other circumstances in connection with it, that we are enabled to correct the error.

Ergates. Allow me to interrupt you for a moment by observing that, besides those which I have already mentioned (namely, diseases and injuries of the brain), there are other physical agents which prevent things, of which we are conscious at the time, from being permanently impressed on the memory. Thus, a drunkard either forgets altogether, or has only a vague recollection of the nonsense which he talked and the follies of which he was guilty, on the previous day while under the influence of alcohol; and those who, for the purpose of undergoing a surgical operation, are placed under the influence of what are called anæsthetic agents, as ether or chloroform, although in most instances they appear to pass into a state of entire insensibility, in other instances groan and struggle, and give evident signs of suffering while the operation lasts, although they remember nothing of it afterwards, and can scarcely be persuaded that what they had so much dreaded is really completed.

Eubulus. I cannot complain of the interruption, as the facts which you mention are very much to the purpose. But I was going on to observe, in connection with our present inquiry, that, without denying the generally received doctrines as to what metaphysicians have called the association or suggestion of ideas, still these do not explain the whole. How often does it happen that thoughts arise, and images present themselves to the mind, which cannot be traced as the immediate result of impressions on the external senses, or of anything that was passing in the mind previously. But may not this be explained by supposing that the brain, as the organ of memory, and therefore of the imagination, is liable to be influenced by a variety of physical impressions communicated from other parts of the corporeal system besides the immediate organs of sense, through the medium of the nerves? Whoever will carefully inquire into what passes within himself, will, I suspect, be satisfied that there are many of his thoughts, and trains of thought, and, I may add, of the agreeable or disagreeable feelings with which they are associated, that cannot be accounted for otherwise.

Ergates. Dreams present some striking examples of what you have now mentioned. You are awaked by a distressing dream, and find yourself labouring under the uncomfortable sensations occasioned by acid in your stomach. You take some magnesia, which will neutralise, or drink a glass of cold water, which will dilute, the acid, lie down again, and enjoy a refreshing sleep. A lady had a small tumour in one leg. It was hard, well defined, exquisitely tender, so that even a slight pressure on it occasioned a severe pain, not only at the instant, but lasting a considerable time afterwards. It seemed to be a tumour of a peculiar kind, well known to surgeons as being occasionally found among the fibres of a nerve. This lady observed that she frequently awoke at night suffering from a frightful dream, which, although it related to some other and quite different subject, she could always trace to an accidental pressure on the tumour. In like manner children who labour under disease of the hip joint are often prevented from falling asleep by pains in the hip and knee, and painful startings of the limb; but when they are asleep, instead of these local symptoms, they are tormented by distressing dreams.

In cases such as these it is reasonable to suppose that the order of the phenomena is as follows. An impression is made on a nerve, and from thence transmitted to the brain, producing in its minute structure certain changes, which affect the mind itself. But there is no doubt that the same effect may be produced without the intervention of the nerves, by the blood acting on the brain. Bichat has shown that the influence of the scarlet or arterial blood is necessary to the due performance of the cerebral functions. If dark-coloured or venous blood be substituted for it, and transmitted to the brain by the arteries, the animal lapses—I will not say into a state of unconsciousness, for of that we know nothing—but into a state of total insensibility to external impressions. This fact being established, we cannot be surprised that blood of an improper quality, or containing something which healthy blood should not contain, may disturb the functions of the brain, so as even to affect the mind itself. The habitual opium-taker, while his favourite drug is circulating in his vessels, instead of being set asleep, is visited by soothing and luxurious thoughts, and enjoys the contemplation of the great things which he means to accomplish, but which he never accomplishes in reality; while the Malay, under the influence of the East Indian hemp, is thrown into a state of excitement, and *runs a muck.** A man has been exposed to the contagion of small-pox. A minute quantity of the poison introduced into the blood acts as what the chemists call a ferment, and occasions the generation in it of a larger quantity of poison similar to itself; and when a certain degree of accumulation of it has taken place, there is a severe attack of fever, and the mind probably is haunted by the phantasms of delirium. After a time the poison is ejected from the blood, and is found deposited in pustules on the surface of the skin, and simultaneously with the appearance of the eruption the fever subsides, and the delirium subsides with it. In a person who has the misfortune of inheriting a gouty habit, or who has (which is a much more common case) produced it in himself by a lazy and luxurious life, there is a superabundance of lithic acid in the blood. This fact has been established by the researches of Dr. Garrod. Then uncomfortable thoughts are presented to his mind; he becomes fretful and peevish, a trouble to himself and, if he be not trained to exercise a moral restraint over his thoughts and actions, a trouble to every one about him. After a while, the poison, as it were, explodes: he has a severe attack of gout in his foot; he is placed on a more prudent diet; the system is relieved of the lithic acid by which it was poisoned. Then the gout subsides; happy and cheerful thoughts succeed those by which the patient was previously tormented, and these continue until he has had the opportunity of relapsing into his former habits, and thus earning a fresh attack of the disease.

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* See Additional Note C, page 248.

There is nothing more interesting in philosophy, nor more important as to practical purposes, than a just appreciation of the influence which the body exercises over the conceptions and feelings of the mind. Certain conditions of the former induce certain conditions of the latter. This is one of the principal trials to which we are here subjected; and, according to our original construction, and some circumstances extraneous to ourselves, the trial is greater to some of us than it is to others. The result may be for good or for evil; and the practical question is, What can we do to promote the former and lessen or prevent the latter? A diseased condition of the blood, where a morbid poison, as that of the small-pox, or the more terrible one of hydrophobia, has been admitted into it, will disturb the nervous system in spite of ourselves. But though this cannot, there is much that can, be helped. No one having the smallest capacity for observation can doubt the vast influence which the condition of the body has on the temper, and even on the moral character. There are certain states of the general health in which the simplest impressions on the organs of sense may be transmitted to the sensorium with something superadded to them, which produces some kind of painful or uneasy feeling. There are others in which the effect is opposite to this. Hence we find one individual cheerful and hopeful under adversity, while another is unhappy and tired of life in the midst of all worldly prosperity. We are told, on high authority, of the necessity of self-control. We are also told how the effort of self-control may be rendered more easy by avoiding those sensual indulgences which tend to derange the functions of the animal system. This rule applies not merely to the profligate and the drunkard. There is many a person in whom a muddled intellect and a peevish temper may be traced to a too great indulgence of the appetite—to eating more than the stomach can digest; to drinking a bottle, or even half a pint of wine daily, and leading otherwise a lazy and luxurious life, but who would be found to have no contemptible powers of mind, and cheerful spirits, if restricted to a more abstemious diet, and to drinking nothing more stimulating than toast and water.

'Orandum est ut sit mens sana in corpore sanô.'

We are all anxious to obtain rank, reputation, and wealth; but that for which we have most reason to be anxious, not only for our own sake, but also for that of others, is such a state of our bodily functions as will enable us to make use of our higher faculties and promote in us happy and contented feelings. Happiness, after all, is not so unequally distributed in this world as to a superficial observer it seems to be. Poverty is terrible if it be such as to prevent the obtaining the actual necessaries of life. But the agricultural labourer, who has enough of wholesome food and warm clothing for himself and his family, and who has the advantage, which cannot be too highly estimated, of living in the open air, has more actual enjoyment of life than the inheritor of wealth, living in a splendid mansion, who has too much of lithic acid in his blood.

You will say that this is a worn-out tale. But let us pursue the subject further, and we shall find that it has extensive ramifications, questions arising out of it appertaining not only to individuals, but to the whole fabric of society. Much is said at present as to the necessity of extending education, as to the means of improving the condition of the multitude. I am not so great a heretic as to deny the advantages of knowledge and of early instruction, especially if it be combined with a proper training of the mind, so as to give the pupil habits of self-restraint. But there is much to be desired besides. Nothing can tend more to every kind of moral and intellectual degradation than the vice of gin-drinking so prevalent in some, but not in all, of the lower classes of society. In a conversation which I had with a very intelligent person employed by the 'City Missionary Society,' whose location was in London among the inhabitants of St. Giles's parish, he said, 'I assure you that there is scarcely any one of them who might not obtain a comfortable livelihood if he could leave off drinking gin.' But see how one thing hangs upon another, and how one evil leads to another evil. Mr. Chadwick has shown that many are driven to drinking gin as affording a temporary relief to the feelings of depression and exhaustion produced by living in a noxious atmosphere; and he gives instances of individuals who had spontaneously abandoned the habit, when they were enabled to reside in a less crowded and more healthy locality, where they could breathe a pure air, instead of loathsome exhalations. The case of such persons is analogous to that of others, who become addicted to the use of opium, as the means of relief from bodily pain. Schools and churches are excellent things, but it is a vast mistake to suppose that they will do all that is required. There can be no feeling of contentment where there is an insufficient supply of wholesome food; and the 'Temperance Society' can make few converts among those who live in crowded buildings, unventilated, and with imperfect drainage. Our late legislation has accomplished much, and probably as much as it can reasonably be expected to accomplish, towards the attainment of the first of these objects; and measures are now in progress which justify the expectation that eventually much good may be done in the other direction also.

Crites. If such causes as those to which you lately referred may produce the effects which you have described; if an unhealthy state of the blood may give rise to delirium in fever, or illusions and horrors of mind in hydrophobia; if opium fills the mind with luxurious thoughts and visions having no foundation in reality; is it not probable that those greater and more permanent distractions of the mind which constitute the various forms of mental alienation may be traced to similar causes, that is, to some physical derangement affecting the organ of memory, and thus disturbing the imagination?

Ergates. I cannot doubt that mental alienation is generally the result of some wrong condition of the body, either functional or organic. Of course I refer not merely to the solid structures, but also to the blood, any deviation of which from its normal or healthy state affects the whole system, and no part so immediately as the brain. Whether there be any exceptions to this rule, it would require more actual knowledge and experience of the subject than I pretend to possess, and more thought than I have bestowed on it, to enable me to determine. Probably there is no degree of knowledge, which it is in the power of man to attain, which could enable us to give a positive answer to this question. Putting it aside, however, for the present, there are abundant proofs that impressions may be made on the brain by other causes simulating those which are made on it by external objects through the medium of the organs of sense, thus producing false perceptions, which may, in the first instance, and before we have had time to reflect on the subject, be mistaken for realities. I have, indeed, already furnished an example of this in the visions presented to us in our dreams under the influence of physical causes.

Crites. I have been accustomed to believe that the latter are not, in reality, different from the objects commonly presented to us by the memory and the imagination; but seeming to be more distinct than usual, because during sleep we have no real objects with which we can compare them; in the same manner as the deception of a panorama depends in part on the circular form of the painting, which excludes real objects from the view.

Ergates. In the visions belonging to our dreams there must be more than what you mention. A friend of mine, on awaking in the morning, perceived what seemed to be a human figure in a sort of Persian dress, standing at the foot of his bed. It was as distinct as the chairs and tables in the room, so that my friend was on the point of going up to it, that he might ascertain what, or rather who, it was. Looking, however, stedfastly at it, he observed that, although the figure was as plain as possible, the door behind it was plainly to be seen also, and presently the figure disappeared. Considering the matter afterwards, he recollected that he had had a dream, in which the Persian figure played a conspicuous part; and thus the whole was satisfactorily explained, it being evident that the dream, as far as this part of it was concerned, had continued after he was awake, and so that the perception of the imaginary object had existed simultaneously with that of the real ones. The same thing occurred to the same person on another occasion, and similar histories have been related to me by others. It is probable that this is the history of many startling and mysterious tales of ghosts and spirits.

But phantoms similar to those which belong to dreams, and which like them do not vanish by an effort of the will, may, under certain circumstances, present themselves to those who are really awake. They may be the result of some actual organic disease of the brain. A gentleman, eighty years of age, had been for some time labouring under hypochondriasis, attended with other indications of cerebral disease. On a cold day in winter, while at church, he had a fit, which was considered to be apoplectic. He was taken home and bled, and recovered his consciousness, not being paralytic afterwards; he died, however, in a few days after the attack. During this interval, though having the perfect use of his mental faculties, he was haunted by the appearance of men and women, sometimes in one dress, sometimes in another, coming into and loitering in the room. They were so distinct that, at first, he always mistook them for realities, and wondered that his family should have allowed such persons to intrude themselves upon him. But he soon, by a process of reasoning, corrected this error, and then talked of them as he would have talked of the illusions of another person. You have probably read the history of Nicolai, the bookseller of Berlin, who was haunted by visions of persons coming into his apartment, sitting down, and even conversing with him and with each other, and this during a period of several months. He also was at first taken by surprise, believing the phantoms to be real objects; but was soon enabled to convince himself that they were not so. His recovery was attributed to an improved state of his bodily health. I must not weary you by referring to other instances of the same kind. The late Dr. Alderson, in an essay which he published nearly fifty years ago, gave an account of several which had occurred under his own observation, in individuals of perfectly sane minds,* and others have been since then recorded by other authors

Examples of deceptive appearances analogous to these, but less remarkable, are not very uncommon. A gentleman of my acquaintance, of a very sensitive and imaginative turn of mind, informed me that, not unfrequently, when he had had his thoughts intensely fixed for a considerable time on an absent or imaginary object, he had at last seen it projected on the opposite wall, though only for a brief space of time, with all the brightness and distinctness of reality.

Crites. If such a person had the misfortune to lose one of his family or a dear friend by death, how easy would it be for him to believe that he had been visited by his apparition afterwards! It is probable that when Swedenborg supposed that he met Moses or Elias in the street, some such object was really presented to his mind; and that even Joanna Southcote, and others who have been regarded as a low order of impostors, were not altogether impostors, but in part the victims of their own imaginations. The subject is one which may well excite our curiosity, and I should be glad to obtain some further insight into it. Under what circumstances do these visions, so like those of our dreams, present themselves to the waking person? Where do they really exist, and what is their origin?

Ergates. I have already stated that in the instance which I quoted on my own authority, the existence of actual disease of the brain was indicated by other symptoms. I have also mentioned that in that of the bookseller of Berlin there was a deranged state of the general health, and that he recovered under a course of medical treatment. In all the cases recorded by Dr. Alderson, the appearances were connected with actual bodily disease, which in two of them was of such a nature as especially to affect the nervous system. We may suppose the part actually affected to be the expansion of the nerve of sight in the retina of the eye; but it is more probable that it is that part of the brain itself which belongs to vision. In confirmation of this opinion, I may refer to a case recorded by Esquirol. A Jewess, who had been for a long time blind, became insane. Her illusions were of the sight, and she was constantly haunted by strange visions. After her death it was ascertained that the two optic nerves, from the part at which they are united within the head (which anatomists call their commissure) to their termination in the retinæ, were shrunk and wasted, so that they must have been wholly incapable of performing their functions.* I may also refer to another case which came under my own observation. A man met with an injury of the head, which, as the event proved, occasioned an extensive fracture in the basis of the skull, with such a displacement of bone as to press on the optic nerves, and render them wholly incapable of transmitting impressions to the brain. He was totally blind; otherwise he was not insensible, though he was slow in giving answers, and peevish when disturbed. On the second day after the accident, there were manifest symptoms of inflammation of the brain. He was in a state of great excitement, delirious, believing that he saw objects which did not exist; and he continued in this state until within a short period of his death.

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* An Essay on Apparitions, by John Alderson, M.D.

Crites. You have spoken of deceptions of the sight. Does nothing like this happen as to the other senses?

Ergates. Certainly it does. The phantoms by which Nicolai was haunted are said to have conversed sometimes with him, sometimes with each other. I know a person who amid the din of London streets occasionally has the perception of his being called by his name, so that he involuntarily turns round to see who calls him. Sir Henry Holland has given an account of a much more remarkable case. A gentleman had symptoms of an affection of the brain, which was attributed to an accidental blow on the head. On the following day he had pretty well recovered. Two days afterwards he was well enough to drive out in his carriage. But now, 'for the first time after the accident, there came on the singular *lusus* of two voices, seemingly close to his ear, in rapid dialogue, unconnected with any present occurrence, and almost without meaning.'* It is not uncommon to find persons, who, when their attention is not otherwise occupied, are distressed by the sound of bells ringing. A gentleman, having what is commonly called a highly nervous temperament, had some teeth drawn while under the influence of chloroform. From that time, whenever his mind was not otherwise engaged, he was tormented by sounds as if a number of persons were yelling and hooting him. I have been told of a great musical genius, who, from the earliest period of his life, has never been without the sounds of music of the most harmonious kind. Then as to the other senses. I remember a man who had a severe blow on the head, occasioning the symptoms which surgeons attribute to a concussion of the brain. He recovered from the other consequences of the injury; but for a long time afterwards everything that he ate had a bitter taste. A friend has informed me of a case in which, after some unusual anxiety of mind, every article of food produced a taste of intense sweetness, this continuing for many months. The case of a person who was tormented by a constant sensation as if a burning coal had been applied to the arm belongs to the same class.

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* Des Malades Mentales, vol. i. p. 195, edit. 1838.

Crites. But are not all such cases as those which you have described, to be considered as examples of mental derangement, though not in its worst and most aggravated form? and does not this correspond with the view of the subject taken by Locke, who regards this disease as affecting the imagination only, and not at all the reasoning faculty?

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* Medical Notes and Reflections, 2nd edit. p. 232.

Ergates. Certainly not; for, with the exception of Swedenborg, no one of the individuals whom I have just now mentioned mistook the deceptions as being connected with real objects. It is true, that some of those who are the subjects of mental derangement may see phantoms and hear strange voices; but they believe them to be realities, and cannot be persuaded that they are otherwise. Besides, as I am led to believe, it is not by this class of illusions that they are most liable to be tormented. As a morbid condition of the brain may produce the impression of visible objects, or of voices, which have no real existence, so it may also produce notions of a more complex and abstract character, and these may be constantly obtruded on the mind, so that the individual is unable to withdraw his attention from them, being, as it would seem, as much beyond the influence of volition as the muscles of a paralytic limb. Thus, one person believes himself to be ruined as to his worldly affairs, and that he and his family, though really in affluence, are reduced to extreme poverty; while another is persuaded that he is in possession of unbounded wealth, the consequence being that he is in danger of being ruined by extravagance; and a third is under the apprehension of his being accused of some dreadful crime, and perhaps seeks a refuge from his fears in self-destruction. It is more difficult to escape from the latter than from the former class of illusions, as the appeal lies not from one sense to another, but to a more refined process of thought and reflection, and the examination of evidence.

With regard to the opinion of Mr. Locke (and I beg of you to observe that I speak not pretending to have any practical knowledge of the subject, but viewing it merely as a physiologist), I own that it seems to me that he has laid down the rule too broadly, and that his explanation will not include the whole phenomena of insanity. In many insane persons, in addition to the illusions under which they labour, the capability of fixing the attention is almost entirely destroyed. The mind hurries on from one thing to another, as if it could find no resting-place; and under these circumstances it is plain that correct reasoning, which Locke defines as 'the perception of the agreement or disagreement of our ideas,' is out of the question. At the same time, this does not prove that the reasoning faculty is primarily affected. The increased intensity of the action of the nervous system, and the imperfect subjection of it to the will, sufficiently explain the whole. In one case, the mind may be occupied with a single object, or a single idea, or combination of ideas. In another case, a constant and rapid succession of different, and perhaps heterogeneous, ideas is presented to it; and the will is equally powerless to dismiss the single idea in the former case, and to stop the current of different ideas in the latter.

In confirmation of these views, it may be observed that mental derangement is, in numerous instances, preceded by a disordered state of the general health, and that it is not uncommon to find it alternating with diseases which affect merely the corporeal functions, or recurring under other circumstances which show that it must have been the result of mere physical agencies.

EUBULUS. You have certainly adduced facts which justify the opinion that mental derangement may be, and for the most part is, the result of some actual physical imperfection, which we may suppose to be functional in some instances, organic in others; and I own that this is to me a very acceptable and consolatory view of the subject. But you cannot deny that in many instances it may be traced just as plainly to the operation of moral causes. The mind may break down all at once under some sudden affliction, or it may yield more gradually where the attention has been long and constantly and anxiously directed to some matter of unusual interest; and thus the apprehension of poverty, the excitement arising from the unexpected possession of wealth, a gloomy and unholy religion, or a long indulgence in dreams of vanity and pride, may upset a vigorous intellect. Such facts as these cannot be questioned—and is not the conclusion from them inevitable?

Ergates. I am quite aware that mental derangement may in many instances be traced to moral causes as its original source, and far be it from me to assert that the one indivisible percipient and thinking being, which each of us feels himself to be, may not be in itself liable to changes, independently of any previous change in the material structure with which it is associated. Still, in the facts which you have mentioned, there is nothing to contradict the opinion that the essence of the disease, even when produced by the operation of moral causes, may be in the nervous system. A physician, whose knowledge of these subjects is not surpassed by that of any one in Europe, assures me that 'when mental derangement seems to have been induced by moral causes, it is generally to be presumed that there was originally an imperfect state of the brain, forming a predisposition to the disease.' Then be it observed, that as the brain may influence the mind, so may the mind influence the brain. It is in this manner that volition, acting on the brain first, and on the nerves afterwards, produces muscular contractions; that grief causes tears to flow from the lachrymal gland; and that the mouth becomes parched, and the digestion of the food interrupted, as a part of the consequences of mental anxiety. So, also, persons have been known to suffer from imaginary hydrophobia, experiencing not a few of the symptoms of that terrible disease. In such cases the mind is affected first, the nervous system afterwards; the latter reacting on the mind, and confirming and continuing the illusion. If the functions of the brain should be thus disturbed during a very long period of time, it seems not improbable that some actual change will at last be produced in its organisation; and, indeed, it is not very easy otherwise to understand how mental derangement, induced by moral causes, should be permanent, when the causes themselves have been in operation only for a limited period. Nor is there in this anything more remarkable than the fact of organic disease of the heart being in many instances distinctly to be traced to severe and long-continued anxiety of mind.

Crites. All this is to me a matter of curious speculation; but it leads to another subject, in which I feel a still greater interest, partly because, from the special nature of my pursuits, it is sometimes forced on my attention, and partly because out of it arise questions which, as they affect our social system, are of great practical importance to us all. Some writers have described, under the name of Moral or Instinctive Insanity, a state of mind in which they say that there are no illusions, nor any affection of the intellect, but in which there is simply a perversion of the moral sentiments—the individual labouring under an impulse to perform certain extravagant and outrageous acts, injurious to himself or others; such impulse being irresistible, so that he is to be held as being no more responsible for his conduct than an ordinary lunatic. Now, I own that, looking at the question merely as one who has some knowledge of human nature, and with no other aid than that of my own common sense, I am very much inclined to doubt the correctness of this doctrine; and I am certain that it is not only dangerous, but unphilosophical, to admit the plea of irresponsibility for those who labour under this so-called Moral Insanity, to the extent to which Dr. Prichard and some others have claimed it for them. You have only to extend the principle a little further, and it will lead you to the conclusion that all mankind are mere machines, and that there is no such thing as human responsibility. Observe, that I use the term Moral Insanity, not as comprehending cases in which there is a belief in things that do not exist in reality, or cases of idiotcy, or those approaching to idiotcy, but limiting it strictly and exclusively to the definition given by writers on the subject. The law makes a reasonable allowance of time for the subsiding of passion suddenly provoked. But we are not, therefore, to presume that the same allowance is to be made for those in whom a propensity to set fire to their neighbours' houses, or commit murder, is continued for months, or weeks, or even for hours. Is it true that such persons are really so regardless of the ill-consequences which may arise, so incapable of the fear of punishment, and so absolutely without the power of self-restraint, as they have been sometimes represented to be? If not, there is an end of their want of responsibility. Let me refer here to the instance of the gouty patient, some time since adduced by Ergates. Under the influence of his disease, every impression made on his nervous system is attended with uneasy sensations. If such a person has exerted himself to acquire the habit of self-control, the evil ends with himself; but, otherwise, he is fractious and peevish, flies into a passion, without any adequate cause, with those around him, and uses harsh words which the occasion does not justify—conduct of which he can offer to himself no explanation, except that he cannot help it, and for which, if he be a right-minded person, he is sorry afterwards. If he were to yield to the impulse of his temper so far as to inflict on another a severe bodily injury, ought it to be admitted as an excuse that Dr. Garrod had examined his blood, and found in it too large a proportion of lithic acid? Yet, when the boy Oxford yielded to what was probably a less violent impulse, which caused him to endeavour to take away the life of the Queen, the jury acquitted him, on the ground of his being the subject of 'Moral Insanity.' It seems to me that juries have not unfrequently been misled by the refinements of medical witnesses, who, having adopted the theory of a purely moral insanity, have applied that term to cases to which the term insanity ought not to be applied at all. It is true that the difference in the character of individuals may frequently be traced to difference in their organisations, and to different conditions as to bodily health; and that, therefore, one person has more, and another has less, difficulty in controlling his temper, and regulating his conduct. But we have all our duties to perform, and one of the most important of these is, that we should strive against whatever evil tendency there may be in us arising out of our physical constitution. Even if we admit (which I do not admit in reality) that the impulse which led Oxford to the commission of his crime was at the time irresistible, still the question remains, whether, when the notion of it first haunted him, he might not have kept it under his control, and thus prevented himself from passing into that state of mind which was beyond his control afterwards. If I have been rightly informed, Oxford was himself of this opinion, as he said, when another attempt had been made to take away the life of the Queen, 'that if he himself had been hanged, this would not have happened.' We have been told of a very eminent person who had acquired the habit of touching every post that he met with in his walks, so that at last it seemed to be a part of his nature to do so; and that if he found that he had inadvertently passed by a post without touching it, he would actually retrace his steps for the purpose. I knew a gentleman who was accustomed to mutter certain words to himself (and they were always the same words), even in the midst of company. He died at the age of ninety, and I believe that he had muttered these words for fifty or sixty years. These were foolish habits, but they might have been mischievous. To correct them at last would have been a very arduous undertaking. But might not this have been easily done in the beginning? and if so—if instead of touching posts, or muttering unmeaning words, these individuals had been addicted to stealing or stabbing—ought they to have been considered as absolved from all responsibility? It has been observed by a physician, who has had large opportunities of experience in these matters, that 'a man may allow his imagination to dwell on an idea until it acquires an unhealthy ascendancy over his intellect.'* And surely, if, under such circumstances, he were to commit a murder, he ought to be held as a murderer, and would have no more claim to be excused than a man who has voluntarily associated with thieves and murderers until he has lost all sense of right and wrong, and much less than one who has had the misfortune of being born and bred among such malefactors.

Ergates. I have no doubt, as you have expressed it, that those who have maintained the doctrine of 'Moral Insanity' have often applied that term to cases to which the name of Insanity ought not to have been applied at all. But I also have no doubt that there has been much mystification of the subject, by the application of the same term to other cases in which illusions really existed, and which might, therefore, have been more properly classed with cases of ordinary mental aberration. At the same time, we must not overlook the fact that there may be, and sometimes is, a real difficulty in determining whether a man who abandons himself to an evil passion, or a mischievous or absurd propensity, labours under illusions or not. For example: a disease has been described under the name of Bulimia, in which the patient is affected with an inordinate appetite, which nothing can satiate, and which his will seems powerless to resist. One individual, whose case is recorded in the 'Transactions of the Royal Society,' would eat an ordinary leg of veal at a single meal, adding to it a store of sow-thistles, and other wild vegetables.* Another would devour raw, and even living cats, rats, and dogs, the entrails of animals, and candles, to the extent of fourteen pounds daily.† Now, except that the passion has another object, there seems to be no essential difference between these cases and that of a man who squanders his property, purchasing articles for which he has no use, and which he immediately lays aside, reckless of the ruin which he is bringing on himself, his wife, and children. But it may be urged, on the other hand, that in Bulimia the sense of hunger, where food is not really required, and which nothing can allay, may not improperly be regarded as an illusion, having, at any rate, a considerable resemblance to the visions, voices, or unfounded conceits, which haunt the imagination of an ordinary lunatic.

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* Anatomy of Suicide, by Forbes Winslow, M.D.

Crites. There seems to be some truth in this comparison. But let us suppose that your patient with Bulimia were to be in the habit of robbing butchers' shops and larders, ought he to be considered as not being responsible for his actions, because he was driven to do so by his inordinate appetite? And this leads me to offer one further observation. If we are not to confound merely mischievous propensities with illusions, we are also not to admit the mere existence of an illusion as being in all cases an excuse for crime. A thorough-going Socialist may be conscientiously persuaded that the unequal distribution of property is contrary to religion and morality. The conviction may be so strong that he not only disregards, but cannot comprehend, the arguments which satisfy men of sober sense that his views are erroneous and absurd. Is this anything more or less than an illusion? and if, under its influence, he were to appropriate to himself his neighbour's property, or abet others in taking it for themselves, is he, therefore, to be regarded as not responsible for what he does? it being borne in mind that the object of human punishment is not to revenge society on the malefactors, but to deter others from following their example. There are many dogs whose natural and original instinct leads them to run after and kill sheep; but a proper discipline teaches them that they are not to do so, and counteracts the instinct. There are, undoubtedly, instances without number of illusions which not only have a firmer hold on the human mind than this particular instinct in dogs, but which neither argument nor discipline can remove or even control: but it is not so in other cases; and surely there is no reason why those of the latter class should not be overruled by means analogous to those which overrule the instinct of the brute. Dr. Mayo, whose attention has been directed, with much success, to this class of inquiries, has arrived at this conclusion; and I do not see how any one can well differ from the opinion which he has expressed.*

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* Philosophical Transactions, vol. xxii.

† London Medical and Physical Journal.

EUBULUS. Believing as I do, with Crites, that the subject which you are now discussing is one of great importance as it affects society at large, I have listened with much interest to the observations which you have made. You, Crites, have pointed out the necessity of not confounding, as has been sometimes done, mischievous or absurd propensities, however strong, with actual insanity. You, Ergates, have endeavoured to show that there is no broad line by which the former can always be distinguished from the latter; and I am inclined to agree with both of you. But I also cannot but assent to the opinion of Crites, when he further stated that the existence of illusions is not in every instance to be regarded as justifying the plea of want of responsibility. It certainly seems to me to be not less absurd in itself than it is dangerous to society at large, to hold that anyone whom the dread of being punished might deter from the commission of crime is not a fit subject for punishment. At the same time, I fully admit that a more or less unsoundness of mind may afford a sufficient reason for commuting or modifying the nature of the penalty. Allow me to add, that it is a very great mistake to suppose that this is a question which can be determined only by medical practitioners. Anyone of plain common sense, and having a fair knowledge of human nature, who will give it due consideration, is competent to form an opinion on it; and it belongs fully as much to those whose office it is to administer the law, as it does to the medical profession.

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* See Additional Note D, page 249.

THE FOURTH DIALOGUE.

Different Functions of the Brain and Spinal Cord—Continuance of Life in some Animals without the Brain—Automatic Motions of Plants and of some of the lower Animals—Multiplication of the latter by Division—The Diplozoon Paradoxon—Buffon's View of the Mode of Existence of the lower Animals—A Nervous System not necessary to simple Animal Life—Origin of the Nervous Force—Influence of the venous or dark-coloured Blood on the Functions of the Nervous System—The Absence of Sensibility or voluntary Power no Proof of the Absence of Consciousness—Dr. Wollaston, &c.—State of Mind preceding Death—Nature and Phenomena of Sleep—Dreams the Result of the Imagination uncontrolled by the Will—Rapidity of Dreams—Their Character influenced by accidental physical Impressions—Supposed Solutions of Problems, &c., during Sleep—Müller's Observations on the Subject—Do Dreams answer any Purpose in the Economy of living Beings?—Inquiries as to the Nature of the Changes which occur in the Nervous System in connection with Mental Operations.

THE clear transparent atmosphere of the preceding day was followed, as might have been anticipated, by rain, which confined us to the house. In the afternoon we were assembled in Eubulus's library, and had been for some time conversing in a desultory manner, when the subject of our former discourse was thus resumed.

CRITES. Ergates regards the brain, properly so called, as the physical organ by means of which alone (to use his own expression) he one indivisible percipient and thinking being which each of us eels himself to be, maintains its communication with the external naterial world. But I own that he did not quite satisfy me that his opinion is correct, and I should be glad to make some further nquiries on the subject. *À priori*, there is no reason why the mind should not be in connection with any, and every, other part f the nervous system; why it should not be present in the eye, nd at once, and without the intervention of any other organ, have direct perception of the picture of external objects which is painted on the retina; or a similar perception of the impressions which the waves of sound make on the nerves in the labyrinth of the ear; or of those which we refer to the sense of touch in the hands or feet, or elsewhere on the surface of the body. Then, if I am not misinformed, the spinal cord in some of the lower animals of the vertebrate class is of considerably larger size than the brain itself. May we not, therefore, conclude that it is at least equal to the brain as to the importance of its functions? Again, mankind have, very generally, referred hope and fear, joy and sorrow, love and hatred, to the heart. May they not have their special seat in the nerves of that organ? I have understood that a distinguished French physiologist supposed what you anatomists call the great sympathetic nerve (which I understand to be connected with, but nevertheless distinct from, both the brain and the spinal cord) to be the actual seat of that class of mental conditions which we call the passions or emotions.

Ergates. I agree with you in the opinion that, *à priori*, there is no reason why all this should not be as you suggest. The only question is as to the matter of fact. You may recollect that in the course of our conversation yesterday I referred to two cases, in one of which pressure on the optic nerve, and in the other disease of the same nerve, occasioned total blindness; but in which nevertheless the individuals thus affected were haunted by illusions, believing that they saw objects which did not actually exist. So if the nerves be divided or materially injured in the thigh, the sense of touch is destroyed in the foot: while, if the leg be amputated, the patient for a long time afterwards feels his feet and toes as if they still belonged to him. The conclusion to be drawn from these facts is sufficiently obvious.

With regard to the spinal cord, we know that it exercises functions of the greatest importance in the animal economy, generating the nervous energy, which is required for muscular action; influencing the secretions; in part regulating the motions of the heart; and probably helping to maintain the action of different organs in that sympathetic union and harmony which is necessary to the due performance of their several functions. The size of the spinal cord bears an exact proportion to what is required of it in those respects, while it has no relation whatever to the faculties of perception and thought. It is true that the spinal cord is composed of the same materials as the brain, in the form of the grey and vesicular, and the white or fibrous, substance; but in the former there is throughout a constant repetition of the same structure; while in the brain, as indeed I explained formerly, there is an almost endless variety as to the mode in which the two elementary substances are arranged; so that we recognise in it, not a simple and uniform organ, but a congeries of organs, each having a peculiar structure, and being evidently intended to answer a special and peculiar purpose. A large extravasation of blood within the head, by the pressure which it causes on the brain, induces a state in which there is a total insensibility to all external impressions, and at the same time an entire suspension of the influence of volition. But the effect of a similar injury of the spinal cord is widely different. The parts below the injury, the communication of which with the brain is thus interrupted, are deprived of their sensibility, The muscles are no longer subjected to the dominion of the will, although they may still contract on the application of mechanical stimuli or electricity. The lower limbs may be made to start by tickling the soles of the feet. But those motions are merely automatic, and we have no reason to believe that they are attended with sensation, or preceded by volition, any more than those of the leaves of the *Mimosa sensitiva*. At the same time, in those parts of the body which are above the injury, and whose nervous communication with the brain is not interrupted, the sensibility and power of voluntary motion are unimpaired, as are also the mental faculties. Singular indeed is the condition of the individual in whom there has been a laceration or other severe injury of the spinal cord in that part of the neck which is immediately below the origin of the nerves belonging to the diaphragm. In him respiration, though imperfectly performed, continues, so that life may be maintained during a period which varies from twenty-four hours to five or six days. He retains his consciousness; he can see and hear, and comprehend what passes around him, but except his head, and the upper part of the neck, his body is as if it did not belong to him. He is a living head, and nothing more. I saw a lady under these circumstances with her mind as active, her sympathy with others, and her sense of duty as perfect, as before the injury had occurred. In fact, the result which follows any severe injury of the spinal cord, though greater in extent, is of the same kind as that which follows the division of a nerve. Then, as to Bichat's hypothesis of the passions or emotions having their seat in the great sympathetic nerve; on a former occasion I referred to the effect of grief in causing tears to flow from the lachrymal gland, and of mental anxiety in stopping the secretion of saliva, and interfering with the digestion of the food in the stomach; and we all know the influence of deep emotion on the action of the heart; but surely it would be a very far-fetched conclusion to infer from such facts as these that grief resides in the ophthalmic branch of the nerve of the fifth pair, or hope and fear in the nerves which supply the heart. Indeed, they show nothing but this, that as certain states of mind affect one class of muscles by means of volition, so other states of mind affect other muscles, or other organs, without the volition being exercised.

We must regard the animal appetites and instincts as being intimately connected with the nervous system, and as having their special places allotted to them in it. But we are not warranted in drawing the same conclusion as to the emotions and passions, properly so called. Hope and fear, joy and sorrow, pride and shame, these, and such as these, are conditions of the mind, which have no abstract or independent existence; but which, as they may be superadded to our perceptions and thoughts, admit of being excited and acted on through the medium of the nervous system. At the same time, as far as we can see, they have no special locality in it.

EUBULUS. But has it not been stated that there are some of the less perfect vertebrate animals, which actually survive decapitation, and live even for several months after being thus deprived of the brain? and is it not the case that some of the lower grade of animals admit of being divided into parts, and that each of these becomes a distinct individual, as if in them the mental principle resided in the animal generally, and were itself capable of division?

ERGATES. You refer to the observations of Le Gallois, who found that certain lizards lived for a very considerable time after the loss of the head; and that, when they died at last, the immediate cause of death appeared to be the want of food. But creatures under such circumstances exhibit no sign of anything more than automatic life. Even breathing is suspended, the blood probably deriving the little oxygen which is required, not from air drawn into the lungs, but from being exposed to the atmosphere in the superficial vessels of the skin. It is true that if the legs be pinched under these circumstances the muscles are made to contract; but this is no more a proof of sensibility than the starting of the limbs, which I have already mentioned as occurring in the human being, on tickling the soles of the feet after an injury of the spinal chord; or the convulsions of epilepsy. Then as to the multiplication of some of the lower orders of animals by division, we know so little of their mode of existence, and it is so entirely different from that of animals of the higher orders, that it really seems to me that we can draw from it no conclusion that would be well applicable to the latter. Is it at all certain that the polypus, in which we find no traces of a nervous system, is really endowed with any higher properties than those of vegetable life? Do the motions of its filaments afford any better evidence of sensibility than is exhibited by many plants, such as the fly-catching *Dionæa*, or the *Mimosa sensitiva?* or than the motions of the minute bodies termed *cilia* in animals? Do not the lacteals show as much discrimination in selecting the chyle, and rejecting other fluids which are not fitted for nutrition, as the polypus shows in catching its food, yet without our being conscious of it? Or, granting the sensibility of the polypus, may it not be a compound animal with various centres of sensation and volition, in like manner as in a tree every bud is a distinct individual, which may live and grow though separated from the parent stock? An example of this mode of existence is supplied by an animal much above the polypus in the scale of living beings. The *diplozoon paradoxon* is described by Nordmann as a parasitic animal which attaches itself to the gills of the *Cyprinus Brama*. It consists in fact of two animals, united in the centre so that they have a part of their viscera in common, but with two distinct nervous systems. As far as the latter are concerned, there is no reason why each half of this double creature should not live very well, though separated from the other.*

I am aware that one of our most celebrated modern physiologists, from observing the multiplication of polypi by the mere division of the animal, and from some other circumstances, has come to the conclusion which you have suggested, that the mental principle, which to our conceptions presents itself as being so pre-eminently, above all other things in nature, one and indivisible, is nevertheless itself divisible, not less than the corporeal fabric with which it is associated. But it is to be observed that, great as is the authority of Müller generally in questions of physiology, in the present instance he may be in some degree prejudiced by his inclination to the pantheistic theory, which has descended from the school of Pythagoras to these latter times, as it had before been derived by him from the Buddhists of the East; and which teaches that all the innumerable variety of living beings which we see around us, are but different manifestations, and as it were emanations, of the one vast intelligent spirit which, pervading the universe,

> 'Agitat molem et magnô se corpore miscet.'

EUBULUS. If my recollection be accurate, Buffon regards the condition of some of the lower animals, taking the oyster as an example, as being that of constant and profound sleep, meaning that they have neither sensation nor volition.

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* Annales des Sciences Naturelles, vol. xxx. 1833.

ERGATES. However that may be, there is no doubt that mere animal life may exist without either the one or the other, or without anything that bears even the most remote relation to the mental principle. For instance, Dr. John Clarke has given an account of 'an extraordinary product of human generation,' in which there was neither brain, spinal marrow, nor nerves, nor heart, nor lungs, but which was nevertheless a living organised mass, containing several bones tolerably well formed, and vestiges of some other organs.*

As I have already mentioned, the nervous system is composed of two substances of different organisation; the one, which is commonly called the medullary, being of a white colour, of a soft consistence, which may be proved by a careful dissection to be composed of fibres; the other of vesicular or cellular structure, of a still softer consistence, more largely supplied with blood-vessels, presenting no fibrous appearance, and of a grey colour. This grey matter exists in much smaller quantity than the medullary, being disposed in layers in which the fibres of the latter seem to have their origin. It is generally supposed that the function of the medullary substance is to conduct, direct, and make use of the nervous force, the latter being generated in the grey substance, and being in itself always one and the same, though converted to different purposes in different parts; much as the electricity generated in a voltaic battery is made by means of one apparatus to produce chemical decomposition, and by means of others to direct the needles of a telegraph, or convert common iron into a magnet. We may carry the parallel between the nervous and the electric force further still. Although the grey matter of the nervous system is necessary for the production of the former, it is not in itself sufficient, any more than the alternate plates of zinc and copper are sufficient for the production of electricity. The acid solution added to the voltaic battery is required in the one case, the presence of blood which has obtained a scarlet colour and undergone other changes by exposure to the air in the lungs, is necessary in the other. In some animals of the cold-blooded classes, the sensibility as to external impressions, and the power of voluntary movement, may indeed remain after the supply of scarlet blood has ceased, but it is only for a short period of time; while in man and in other warm-blooded animals the suspension of the same faculties, under the same circumstances, seems to be, not absolutely, but almost instantaneous. In a person who is drowned, or otherwise suffocated, and in whom the dark-coloured blood is transmitted to the brain by the action of the heart, two or three minutes are sufficient to produce the effect which has been described. This has been fully explained by Bichat, whose observations on the subject I had occasion to mention formerly. If you wish to obtain further information on it, and will refer to the 'Récherches sur la Vie et la Mort,' you will be well rewarded for your labour.

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* Philos. Transactions, 1793, p. 154.

EUBULUS. Under this view of the subject, the dark-coloured blood affects the brain simply by a negative influence; by depriving it of that, whatever it may be, which exists in the scarlet blood, but not in the dark-coloured blood, and which is necessary to the generation of the nervous force. But, if this were all, the brain ought to resume its functions immediately on the supply of scarlet blood being restored. Is it so in reality? I have heard of drowned persons who remain insensible for a long time after they were taken out of the water, although they recovered ultimately.

ERGATES. Your observation is quite correct. In fainting, or, as we technically term it, in syncope, the supply of blood to the brain is interrupted altogether—both of that which is scarlet and of that which is dark-coloured; and if the syncope be complete, there is a state of apparent insensibility, from which, however, when the action of the heart is restored, the patient very soon recovers. But the dark-coloured blood, if it has once been transmitted to the brain, even for two or three minutes, leaves an impression on it, from which it may not recover for half an hour or even longer. After strangulation, especially, individuals have sometimes remained in a state of apparent insensibility for some hours; in fact, the dark-coloured blood transmitted to the brain operates as a narcotic poison. I need scarcely remind you that there are very many foreign substances, as for example, alcohol, chloroform, opium, the woorara, which introduced into the circulation produce the same effect, even though the supply of scarlet blood is not interrupted. Of the *modus operandi* of such terrible agents we are wholly ignorant. All that we know is the simple fact, that when their operation is complete, they render the brain insensible to the impressions made on the external senses, and incapable of transmitting the influence of volition to the muscles. Pressure on the brain, or a stroke of lightning, may produce the same effect.

EUBULUS. In short, a condition of the brain producing unconsciousness may be produced in various ways.

ERGATES. I have purposely avoided using the word unconsciousness, for as to that it is plain that we know nothing. The mind may be in operation, although the suspension of the sensibility of the nervous system and of the influence of volition over the muscles destroys its connection with the external world, and prevents all communication with the minds of others. It is indeed difficult to say even when the external senses are completely and absolutely closed. I might refer to numerous facts which have fallen under my observation as illustrating this subject; but the following will be sufficient. An elderly lady had a stroke of apoplexy: she lay motionless, and in what is called a state of stupor, and no one doubted that she was dying. But after the lapse of three or four days, there were signs of amendment, and she ultimately recovered. After her recovery she explained that she did not believe that she had been unconscious, or even insensible, during any part of the attack. She knew her situation, and heard much of what was said by those around her. Especially she recollected observations intimating that she would very soon be no more, but that at the same time she had felt satisfied that she would recover; that she had no power of expressing what she felt, but that nevertheless her feelings, instead of being painful or in any way distressing, had been agreeable rather than otherwise. She described them as very peculiar; as if she were constantly mounting upwards, and as something very different from what she had ever before experienced. Another lady, who had met with a severe injury of the head, which caused her to be for some days in a state of insensibility, described herself as having been in the enjoyment of some beatific visions, at the same time that she had no knowledge of what had actually happened, or of what was passing around her. I have been curious to watch the state of dying persons in this respect, and I am satisfied that, where an ordinary observer would not for an instant doubt that the individual is in a state of complete stupor, the mind is often active even at the very moment of death. A friend of mine, who had been for many years the excellent chaplain of a large hospital, informed me that his still larger experience had led him to the same conclusion. A remarkable example of this occurred in the case of the late Dr. Wollaston. His death was occasioned by a tumour of the brain, which, after having attained a certain size, encroached on the cavities (or, as they are technically termed, the ventricles) of the brain, and caused an effusion of fluid into them, producing paralysis of one side of the body; and it is worthy of notice that certain symptoms which he had himself noted, and as to the cause of which he had been in the habit of speculating, proved that this organic disease must have existed from a very early period of his life, without interfering with those scientific investigations which made him one of the most eminent philosophers, and one of the greatest ornaments, of the age in which he lived. During his last illness his mental faculties were perfect, so that he dictated an account of some scientific observations which would have been lost to the world otherwise. Some time before his life was finally extinguished he was seen to be pale, as if there were scarcely any circulation of blood going on; motionless, and to all appearance in a state of complete insensibility. Being in this condition, his friends, who were watching around him, observed some motions of the hand which was not affected by the paralysis.

After some time it occurred to them that he wished to have a pencil and paper, and these having been supplied, he contrived to write some figures in arithmetical progression, which, however imperfectly scrawled, were yet sufficiently legible. It was supposed that he had overheard some remarks respecting the state in which he was, and that his object was to show that he preserved his sensibility and consciousness. Something like this occurred some hours afterwards, and immediately before he died, but the scrawl of these last moments could not be deciphered.*

EUBULUS. You might refer, as confirming the observations which you have just made, to that interesting letter of Sir Francis Beaufort (which some of us had seen long ago in manuscript, and which is now generally known, having been published by the late Sir John Barrow in his autobiography), in which the writer describes what happened to himself when he was preserved from being drowned; when 'every incident of his former life seemed to glance across his recollection in a retrograde succession, not in mere outline, but the picture being filled with every minute and collateral feature,' forming 'a kind of panoramic view of his entire existence, each act of it accompanied by a sense of right and wrong.' †

ERGATES. I have been informed of some other cases in which the same thing happened, and all this must have been in the brief space of a very few minutes. But I have also been informed of other instances of individuals whose minds had been affected very much in the same way when they were suddenly placed in a situation which threatened immediate death, although they were not at all deprived of their sensibility and self-possession. It is probable that histories such as these suggested that rather curious tale of the Chec Chehabeddin and the Infidel Sultan of Egypt, which used to astonish my youthful imagination, in reading the Persian and Turkish tales. The accounts, however, given after recovery from drowning, vary very much. Some, whatever they may have felt at the time, remember nothing except their having been overcome by a sense of insuperable drowsiness. In one instance, as a naval officer informed me, a sailor, who had been snatched from the waves, after lying for some time insensible on the deck of the vessel, proclaimed on his recovery that he had been in Heaven, and complained bitterly of his being restored to life as a great hardship. The man had been regarded as a worthless fellow; but from the time of the accident having occurred, his moral character was altered, and he became one of the best conducted sailors in the ship.

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* See Additional Note E, page 250.

† Autobiographical Memoir of Sir John Barrow, Bart., p. 398.

Eubulus. We may conclude, from what you now have stated, that drowning, terrible as it appears to be, is not, after all, either morally or physically, a painful death; and this is confirmed by the experience of a friend of my own, who very nearly lost his life in this manner. He says that the last thing which he remembers is looking at the pebbles and weeds at the bottom of the river, with little or no fear of what was about to happen, and no bodily suffering. I suppose that it is the same whenever death takes place in the same manner: in cases of strangulation, for example.

Ergates. Really, according to my observation, the mere act of dying is seldom, in any sense of the word, a very painful process. It is true that some persons die in a state of bodily torture, as in cases of tetanus; that the drunkard, dying of *delirium tremens*, is haunted by terrific visions; and that the victim of that most horrible of all diseases, hydrophobia, in addition to those peculiar bodily sufferings from which the disease has derived its name, may be in a state of terror from the supposed presence of frightful objects, which are presented to him as realities, even to the last. But these, and some other instances which I might adduce, are exceptions to the general rule, which is, that both mental and bodily suffering terminate long before the scene is finally closed. Then as to the actual fear of death: it seems to me that the Author of our existence, for the most part, gives it to us when it is intended that we should live, and takes it away from us when it is intended that we should die. Those who have been long tormented by bodily pain are generally as anxious to die as they ever were to live. So it often is with those whose life has been protracted to an extreme old age, beyond the usual period of mortality, even when they labour under no actual disease. It is not very common for any one to die merely of old age:—

> 'Like ripe fruit to drop
> Into his mother's lap.'

But I have known this to happen; and a happy conclusion it has seemed to be of worldly cares and joys. It was like falling to sleep, never to awake again in this state of existence. Some die retaining all their faculties, and quite aware that their dissolution is at hand. Others offer no signs of recognition of external objects, so that it is impossible for us to form any positive opinion whether they do or do not retain their sensibility; and others, again, as I have already stated, who appear to be insensible and unconscious, when carefully watched, are found not to be so in reality; but they die contentedly. I have myself never known but two instances in which, in the act of dying, there were manifest indications of the fear of death. The individuals to whom I allude were unexpectedly destroyed by hæmorrhage, which, from peculiar circumstances, which I need not now explain, it was impossible to suppress. The depressing effects which the gradual loss of blood produced on their corporeal system seemed to influence their minds, and they died earnestly imploring that relief which art was unable to afford. Seneca might have chosen an easier death than that from opening his arteries.

Eubulus. In the account which you have now given us, it seems to me that you have made a considerable omission, inasmuch as you have said nothing as to the influence of religious sentiments on the minds of dying persons; of the hopes and fears connected with the retrospect of a well-spent or ill-spent life, and with the prospect of what is to happen after the greatest and most mysterious change belonging to humanity has taken place.

Ergates. You have called our attention to a subject involving considerations to which no one can be indifferent. But you do me an injustice, if you suppose that I have been unmindful of it. What I have said refers only to the last stage in the process of dissolution. There is no doubt that a pure and simple religious faith, and a firm reliance on the Being who has placed us here, contribute more than anything besides to disarm death of its terrors, deprive 'the grave of its victory,' and smooth the passage of the humble and sincere believer to the termination of his worldly career. Nevertheless, according to my own experience, and what I have heard from others, the influence of religious feelings is, for the most part, not so much perceptible at the moment when death is actually impending, as it is at an earlier period, when the individual, who was previously in health, or supposed himself to be so, first discovers that it is probable that he will die.

Crites. You have compared death from mere old age to falling asleep never to awaken again in this world. This brings us to another subject, not very distantly related to that which we have been just discussing; at least, so thought the Latin poet, when he wrote—

> 'Quid est somnus, gelidæ nisi mortis imago?'

What is sleep itself? Wherefore is it required? What is the condition of the nervous system on which it immediately depends? And what, during sleep, is the actual condition of the physical and mental faculties?

Ergates. One of your questions certainly cannot be answered. It is plain that in some respects the condition of the nervous system must be different during sleep from what it is when we are awake; but it seems impossible that we should know in what that difference consists, when we consider that neither our unassisted vision, nor the microscope, nor chemical analysis, nor any analogy, nor any other means at our disposal, enable us to form any kind of notion as to the actual changes in the brain or spinal chord on which any other nervous phenomena depend. Then, as to the other points to which you have adverted, the subject has been so frequently treated of by others, that there is little or nothing new to remark upon it.

It appears that in human beings, and in all animals of the higher classes, those functions, which Bichat has described as constituting the system of organic life, may continue to be performed without the need of repose; but that it is quite otherwise with regard to those which the same physiologist has referred to animal life, and which are connected with the mental principle. It is for the latter, and not for the former, that sleep is required. As Eubulus observed on a former occasion, the action of the heart, and of the muscles of respiration, the digestion of the food, the various secretions, the generation of animal heat, all these functions are performed during sleep, as well as when we are awake; and, so far, the sleep of human beings differs very much from the torpor of hybernating animals, in whom, during the winter, these functions are reduced to the very lowest degree of activity. But, if we extend our inquiries to the functions of animal life, we find, that if we act with the voluntary muscles, if we think, and even if we merely attend to the sensations which are derived through the organs of sense, or to those which arise spontaneously in our minds, after a time what we call a sense of weariness arises, and we require repose; and it is this repose which sleep affords us. It would appear that during sleep there is an accumulation of the nervous force, which is brought into use, and gradually expended after sleep is terminated; the expenditure of it being greater, and the exhaustion more complete accordingly as the volition is more or less exercised. The muscles of the limbs may be for a long time in a state of involuntary contraction (as in cases of tetanus or catalepsy) without weariness being induced; but under the influence of the will, they cannot remain contracted for more than a few minutes at a time. In like manner visions may pass before the mind when it is entirely passive, without causing fatigue; but it is quite otherwise when we endeavour to arrest their progress, to view them under different aspects, and to compare them with each other. This occasions weariness, and the necessity of repose, as much as voluntary muscular exertion; and, at intervals, of that complete repose which belongs to sleep; and these things justify the opinion, which though it might not have originated with him, was first brought into notice by Dr. Darwin, that the essential part of sleep is the suspension of volition.

CRITES. But some objections may be made to this explanation. We see persons turn round in their sleep, and hear them talk in their sleep, which must be regarded as a proof that their volition is exercised. Besides, we breathe in our sleep, and is not this a voluntary process?

ERGATES. Such objections are easily answered. There are, in fact, degrees of sleep. It may be so incomplete that the individual may be moving and awaking at intervals during the whole night. As to breathing, I apprehend that no one who is at the pains to consider the subject can doubt that, although to a certain extent it may be influenced by the will, this function is, under ordinary circumstances, as independent of it as the action of the heart, or the peristaltic motion of the intestines. We may by a powerful effort suspend the action of the respiratory muscles during a limited time. It is said that the divers for pearls can do this for a minute, or even longer. At last, however, the will is powerless, and we breathe in spite of it. Again, you may say that a sound or touch, which would be heard or felt by a waking person, may not affect us at all when we are asleep; and that this shows that there is something more than the mere absence of volition. But observe, at all times, what a multitude of impressions are made on our senses, of which we take no cognisance. I am engaged in writing a letter, or in reading a book in which I am much interested; a friend comes into the room, opens and shuts the door, or he may even speak to me in his ordinary tone of voice, and I know nothing of it. It is obvious, that unless our attention be directed to them, the impressions on our senses are not communicated to the mind; and such an effort of attention implies an effort of volition? But my friend speaks to me in a louder tone, which rouses my attention; and then I hear all that he says in his ordinary voice afterwards. So it is during sleep. Those smaller sounds which we hear distinctly when we lie awake, in the stillness of the night, are during sleep unnoticed. So is the light from the rushlight. But a tempest of wind, or the morning sun pouring in his rays through the window, rouses our attention, and with this effort of attention sleep is terminated.

I may here refer to the state of mind during what is popularly termed 'the nightmare,' as illustrating this subject. In this case sleep is imperfect. We are to a certain extent aware of our situation. We know where we are, but we feel as if some power oppressed us, and prevented our moving our limbs. The fact is, not that the muscles will not obey the will, but that the will itself is not exercised. The paralysis and catalepsy of hysterical patients is of the same kind, and both the one and the other immediately vanish if a strong impression be made on the senses, or even on the imagination.

Sound sleep is incompatible with voluntary exertion, mental or bodily. After long watchfulness, or severe labour, we sleep in spite of ourselves, because the power of exercising the volition is exhausted: if we would sleep under other circumstances, the first thing that we do is to abstain from exercising it. We place ourselves in that position in which we can remain without calling into action any of our voluntary muscles; we close our eyes that we may not be tempted to attend to visible objects; we exclude from our minds all disagreeable or otherwise exciting subjects to which our attention might be too earnestly directed. We cause a child to sleep by rocking him in his cradle. The so-called mesmeric passes may produce the same effect. When I do not easily fall asleep at night, I frequently succeed in obtaining sleep by watching the strange, indescribable, and ever-varying spectra, which I refer to the eye, though they are probably in the brain itself, and which present themselves when real objects are excluded from the sight. It is not that on such occasions as those to which I have referred, there is absolutely no effort of attention, but the effort is so slight that it is next to none at all, and readily ceases of itself, at the same time that it prevents the greater effort which I should be led to make if things of higher interest were to occupy the mind.

There are physical causes within ourselves, and independent of all external circumstances, which interfere with sleep—bodily pain, for example, or acid in the stomach. It may be said that actual pain, and the disagreeable sensations produced by indigestion, prevent sleep, as a strong light might prevent it, by too powerfully exciting the attention. At the same time, there is no doubt that there is sometimes a morbid condition of the nervous system, the nature of which we cannot well explain, which is incompatible with sleep. The patient says, 'I feel fatigued and wearied, and that I want to sleep, but I cannot sleep.'

Eubulus. I have understood that this state of the system, when long continued, is sometimes the forerunner of mental derangement; and I can well understand it to be so. It is reasonable to suppose that the absence of its natural refreshment would powerfully affect the nervous system. Indeed, it happened to myself to be acquainted with a case of this kind. A gentleman of my acquaintance, in whose family circumstances had occurred which were to him a source of intense anxiety, passed six entire days and nights without sleep. At the end of this time he became affected with illusions of such a nature that it was necessary to place him in confinement. After some time he recovered perfectly. He had never shown any signs of mental derangement before, nor had any one of his family, and he has never since been similarly affected. This was an extreme case. But do not examples of the want of sleep producing very similar results, though in a very much less degree, occur under our observation constantly? How altered is the state of mind in any one of us after even two sleepless nights! Many a person, who under ordinary circumstances is cheerful and unsuspicious, becomes not only irritable and peevish, but also labours under actual though transitory illusions; such, for example, as thinking that others neglect him, or affront him, who have not the smallest intention of doing either the one or the other.

Ergates. I have observed such effects as these repeatedly in nurses who have been harassed by an incessant attendance on sick persons during many successive days and nights; and this goes far towards explaining the origin of a vice to which individuals of this class too frequently become addicted. Alcohol removes the uneasy feeling, and the inability of exertion, which the want of sleep occasions. I have, sometimes, when I have been writing late at night, and much fatigued, so that I could scarcely fix my attention on the thing before me, feeling as if my head were almost too large for the room to contain it, obtained complete relief by taking a single glass of wine. But such relief is only temporary. Stimulants do not create nervous power; they merely enable you, as it were, to use up that which is left, and then they leave you more in need of rest than you were before. The same observation applies to powerful mental excitement, with this difference, however, that it enables you to overcome the sense of exhaustion more completely, at the same time that it has a less transient operation than any merely physical stimulus.

Crites. The observations which you have now offered relate chiefly to our physical condition during sleep. But the state of the mind during sleep is to us, who are not physiologists, a question of even greater interest than this. Eubulus made some remarks on this subject on a former occasion. Perhaps he can give us some further insight into it.

Eubulus. Indeed, it is difficult for me to say anything without the risk of repeating what I have incidentally said already. Besides, I have no knowledge of the subject beyond that which is within the reach of any other person with common powers of observation.

During what may be called sound sleep, those impressions on the external senses, of which we take cognisance while we are awake, are altogether unnoticed. But it is not so with regard to those changes which are taking place in the brain itself; and that which constitutes the imagination during the day is the foundation of our dreams at night. There is, however, a great difference in the two cases, to which I adverted formerly. The imagination while we are awake is regulated by the will. We can arrest its visions as they pass before us, compare them with each other, and dismiss them as we please. But it is not so with our dreams at night. Here the visions which arise, uninfluenced by the will, succeed each other according to no rule with which we are acquainted, forming strange combinations, often wholly unlike anything that really occurs; and not less differing from reality in the rapidity with which they come and depart. You are called in the morning, and fall asleep again. Perhaps you have slept only one or two minutes, but you have had a long dream. The late Lord Holland was accustomed to relate the following anecdote of what had happened to himself. On one occasion, when he was much fatigued, while listening to a friend who was reading aloud, he fell asleep, and had a dream, the particulars of which it would have occupied him a quarter of an hour or longer to express in writing. After he awoke, he found that he remembered the beginning of one sentence, while he actually heard the latter part of the sentence immediately following it, so that probably the whole time during which he had slept did not occupy more than a few seconds. Mr. Babbage had a similar opportunity of measuring the real duration of a dream. While travelling with a friend in Italy, being much wearied, he fell asleep, and dreamed a succession of events as having occurred in England. When he awoke he heard the concluding words of his friend's answer to a question which he had just put to him. I mention these things, however, only in the way of illustration, and not as being of any very unusual occurrence. Similar instances are referred to by Lord Brougham in his 'Discourse on Natural Theology;' and may, if we look for them, be found within the range of our individual experience. If we were to pursue this subject it would lead us to some curious speculation as to our estimate of time, and the difference between the real and the apparent duration of life. The measure of time which we make by our own feelings is a very different matter from that which uncivilised man makes by the moon and stars, and which we now make by clocks and almanacks. The apparent duration of time is longer or shorter in proportion as a greater or smaller number of different states of mind follow each other in succession. To a child, whose imagination is constantly excited by new objects, and whose temper passes more easily from one passion to another, a year is a much longer period of time than to the grown-up man. As we advance in age so do the years pass more rapidly. We may suppose the life of the vivacious butterfly, which exists only for a single season, to be apparently longer than that of the slowly moving tortoise, whose existence is prolonged for one or two centuries; and that there is a similar difference, though in a less degree, between the life of the enterprising man, whose progress is crowded with events, and with alternate hopes and fears, and that of another who, with more limited desires, keeps 'the even tenor of his way.'

During sleep ordinary impressions pass unnoticed. But impressions of a stronger kind rouse the attention, and in so doing put an end to sleep; while those of an intermediate kind affect us in another way, by giving a peculiar character to our dreams. Ergates made the same remark in one of our former conversations, referring to acid in the stomach, and some other cases, as illustrating the subject. It occurs to me to add another example to those which he has adduced. It lately happened to myself to dream that some one had given me a shellfish in a shell something like that of a muscle; that I ate it, and that after it had been swallowed I felt it to be very acrid, and that it produced a pain in my throat. When I awoke I found that I laboured under a sore throat, which must have suggested the dream. It is a curious fact that we may have a long dream in the act of awaking from our sleep. A military officer informed me, that while serving in the Peninsular war he had frequently been roused from his sleep by the firing of a cannon near his tent, and that he had a dream, including a series of events, which might be distinctly traced to the impression made on his senses by the explosion. Facts of this kind have inclined

Lord Brougham to the opinion that we never dream except while in the state of transition from being asleep to being awake. But I own that this seems to me to be a mistake. First, there is no sufficient proof of it being so; and secondly, we have a proof of the contrary in the fact that nothing is more common than for persons to moan, and even talk in their sleep without awaking from it. Even in the case of a dog, who is sleeping on the rug before the fire, if you watch him you can scarcely doubt that he is sometimes dreaming though he still remains asleep. I should myself be more inclined to doubt whether we ever sleep without some degree of dreaming. At any rate, not to dream seems to be, not the rule, but the exception to the rule: for it rarely happens that we awake without being sensible of some time having elapsed since we fell asleep; which is in itself a proof that the mind has not been wholly unoccupied. That on such occasions we have no distinct recollection of our dreams proves nothing. Referring again to the instance of persons who talk in their sleep, we often find that they have not the smallest recollection of their having dreamed afterwards. It is only those dreams which affect us very strongly, and which occur immediately before we awake from sleep, that we really remember; and even of these the impression is not in general sufficient for us to retain it for more than a very few minutes. If a dream be remembered longer, it is only because we have thought of it after it occurred, and have thus given it a place in our memory which it could not have obtained otherwise. And this leads me to observe that, although memory does so little as to dreams, dreams throw some light on this wondrous faculty. I know not indeed what has happened to others, but it certainly has often happened to myself to dream of something that had occurred in my boyish days, and of which, as it had not been present to my thoughts for many years, it might well be supposed that it was wholly forgotten. On one occasion I imagined that I was a boy again, and that I was repeating to another boy a tale with which I had been familiar at that period of my life, though I had never read it nor thought of it since. I awoke, and repeated it to myself at the time, as I believe accurately enough, but on the following day I had forgotten it again. We may conclude from this and from some other analogous facts, that many things which seem to be erased from our memory are not erased from it in reality; that the impression remains, and that if we are not conscious of it, it is merely because the secret spring has not been touched, which would bring it again under our observation.

Crites. What you have now mentioned shows that, however capricious and irregular during sleep the imagination may be, there are exceptions to the general rule. I have heard of mathematicians who have solved problems, and of others who have composed poetry, in their sleep. An acquaintance of mine, a solicitor, was perplexed as to the legal management of a case which concerned one of his clients. In a dream he imagined a method of proceeding which had not occurred to him when he was awake, and which he afterwards adopted with success.

Eubulus. I may refer to some analogous instances which have come within my own knowledge. A friend of mine, a distinguished chemist and natural philosopher, has assured me that he has more than once contrived an apparatus for an experiment which he proposed to make, in a dream; and another friend, who combines mathematical with all sorts of knowledge besides, has solved problems in his sleep which had puzzled him when awake. But these things are rare exceptions to the general rule. They do not, as it seems to me, at all controvert the opinion that the essential character of sleep is the suspension of volition; and, on this hypothesis, they are easily explained. There are, as Ergates has observed, degrees of sleep; and in a dream which occurs between sleeping and waking, the power of attention may be exercised, though not to the same extent as when we are completely awake. Besides this, however, it would indeed be a strange thing, in the crowded chapter of accidents, if among the vast number of combinations which constitute our dreams, there were not every now and then some having the semblance of reality. Further, I suspect that in many of the stories of wonderful discoveries made in dreams, there is much of either mistake or exaggeration; and that if they could have been written down at the time they would have been found to be worth little or nothing. Knowing how imaginative a person Coleridge at all times was, I may, I hope, be excused for saying that it is more easy to believe that he imagined himself to have composed his poem of Kuhla Khan in his sleep, than that he did so in reality. I may here refer to the experience of a distinguished physiologist on this subject. 'Sometimes,' says Müller, 'we reason more or less accurately in our dreams. We reflect on problems, and rejoice in their solution. But on awaking from such dreams the seeming reasoning is found to be no reasoning at all, and the solution over which we had rejoiced to be mere nonsense. Sometimes we dream that another proposes an enigma, that we cannot solve it, and that others are equally incapable of doing so, but that the person who proposed it himself gives the explanation. We are astonished at the solution, which we had so long endeavoured to find. If we do not immediately awake, and afterwards reflect on this proposition of an enigma in our dream, and on its apparent solution, we think it wonderful; but if we awake immediately after the dream, and are able to compare the answer with the question, we find that it was mere nonsense. I have at least several times observed this in my own case.'*

Ergates. Still, without referring to such exercises of the intellect as Müller has described in the passage which you have now quoted, it must be owned that there is often a remarkable degree of coherence in our dreams. A drama is performed, including a series of events in which we ourselves are concerned, and having a mutual relation to each other. There are other actors in it, who seem to speak and act independently of ourselves, as if influenced by other motives, and aiming at other objects, with regard to which we do not concur, or to which we may be actually opposed. Scenes are presented to us, in which it seems that an intelligence is exercised, although we do not understand how that intelligence can be our own. How is it that these things happen? I own that I search in vain for any very satisfactory explanation.

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* Müller's *Physiology*, translated by Baly, p. 1417.

Eubulus. Another question arises as to dreams, which it is even more difficult to answer than that which you have suggested. Are they merely incidental effects of the existing order of things, as determined by the will of the Creator of the universe; or do they answer any special purpose, and lead to any ulterior consequences? In a machine of human invention, effects arise which are truly incidental; that is, which were never contemplated or intended by the inventor. For instance, it was casually discovered that an abundance of electricity may be obtained from the steam supplied by the boiler of a steam-engine. But such a result had never been anticipated by those to whom we are indebted for this great invention. Does anything like this happen with regard to the machinery of the universe? Is it not more probable that everything that occurs has been anticipated, and has its definite and appointed purpose? I believe that no one has hitherto offered any certain or satisfactory explanation of the uses of the spleen, and that it is known that animals may live, and apparently in good health, after that organ has been removed. So, also, no satisfactory explanation has yet been offered of the functions of the thyroid gland or the renal capsules. Yet no one believes the formation of these organs to be merely incidental, or doubts that they have some special offices allotted to them. Dreams are, at any rate, an exercise of the imagination, and one effect of them may be to increase the activity of that important faculty during our waking hours. As they are influenced by our prevailing inclinations, so they may help us to form a right estimate of our own characters; and assuredly it would be presumptuous to say that they may not answer some still further purpose in the economy of percipient and thinking beings.

Crites. Before our conversation for this day is concluded, there is one other inquiry which I would make of Ergates. Believing as I do that the percipient, conscious, and intelligent mind belongs to a mode of existence wholly different from that of the senseless bodies by which we are surrounded; still I cannot but admit that there must be certain changes taking place in the nervous system in connection with mental processes, some of these being transient in their nature, while others are so far permanent that they may not be effaced during the longest life. Now, with regard to these changes, Ergates has stated that 'their exact nature is a mystery which we have no means of unravelling, and that this is a kind of knowledge as much beyond our reach as that of the structure of the sun, or of the central parts of the earth.' Not disputing the correctness of this statement, yet I see no reason why we might not be able to form some general notion on the subject, and the following questions naturally present themselves to us. Are the changes which the nervous system undergoes simply mechanical? or are they of the same kind as those chemical changes which take place in inorganic matter? or do they rather belong to that class of phenomena which we refer to imponderable agents, such as electricity and magnetism, by virtue of which a piece of sealing-wax rubbed with a silk handkerchief draws light bodies to itself, or a bar of iron becomes endued with the attractive property of a magnet?

Ergates. Although these subjects have not been hitherto formally discussed, still you may on some points anticipate my answer from observations which I have already made incidentally. What I have to say may indeed be comprised in a few words, as my object will be to limit myself to that we really know, without entering into speculations such as those in which some physiologists have delighted to indulge, and which, however ingenious they may be, have no better foundation than the imagination of the authors.

1. The transmission of impressions from one part of the nervous system to another, or from the nervous system to the muscular and glandular structures, has a nearer resemblance to the effects produced by the imponderable agents to which you have alluded than to anything else. It seems very probable indeed that the nervous force is some modification of that force which produces

the phenomena of electricity and magnetism; and you may recollect that I have already ventured to compare the generation of it by the action of the oxygenised blood on the grey substance of the brain and spinal chord, to the production of the electric force by the action of the acid solution on the metallic plates in the cells of a voltaic battery.

2. We know that the solid parts of the body are in a state of perpetual change. There is a constant influx of new materials supplied by the digestive organs, and in other ways; and a corresponding efflux of the old materials by means of the various excretions, especially by that of the kidneys. The brain itself forms no exception to the general rule. We cannot otherwise account for its growth in the early part of life, nor for the alterations in its structure which arise as the consequence of disease, nor for those other changes which occur in extreme old age. The molecules of the brain in a man of twenty years of age are not the same with those which formed the brain of the same individual when he was ten years old, nor with those of which it will be composed when he arrives at the age of fifty years. The mind preserves its identity, but there is no corresponding identity of the corporeal organ with which it is associated; and we may even venture to assert that the brain of to-day is not precisely and in all respects the same with the brain of yesterday, and that it will not be the brain of to-morrow.

3. We cannot suppose that such deposition of new materials and abstraction of old ones can be effected by mere mechanical means, as you would take one brick from a building and substitute another in its place. The elements of which the nervous system is composed exist in the blood, but they must undergo a new chemical combination before they can be incorporated with it; and in like manner they must undergo a chemical change of an opposite kind before they can re-enter the current of the circulation. The precise character of these chemical changes we have no means of ascertaining, but whatever it may be, there is reason to believe that in proportion as the nervous system is more or less

exercised, whether it be in connection with mere corporeal functions or with mental processes, so do they take place to a greater or less extent. As relating to this subject, it may be observed that the nervous substance is distinguished from all the other tissues (with the exception of the bones) by the very large proportion of phosphorus which enters into its composition, amounting to 1·5 parts in 100, and to as much as one-thirteenth of the solid matter which remains after the evaporation of the water; and that one result of over-exercise of the nervous system is the elimination of an unusual quantity of salts containing phosphorus by means of the secretion of the kidneys. This fact was first observed by Dr. Prout, who has given it as his opinion 'that the phosphorus in organised beings is in some measure connected with nervous tissues and nervous action,' and who in another place refers to 'severe and protracted debilitating passions, and excessive fatigue, as the general causes of' what he terms the 'phosphatic diathesis.'*

4. With regard to those more permanent changes in the brain to which Crites has referred as connected with the memory, and what is called the association of ideas, and I may add, with our mental habits and dispositions as far as these are dependent on physical organisation, I have nothing to offer beyond what I have expressed already. There is, I apprehend, sufficient evidence that such changes do certainly take place, but as to their real nature we not only know nothing, but have no means of obtaining any actual knowledge. The improved microscopes of the present day have enabled us to unravel to a considerable extent the minuter tissues of the animal body; but nevertheless, in an inquiry such as this, they afford us no assistance. There can be no doubt that there is as much in the animal structures beyond the reach of the microscope as there is in the vast universe around us beyond the reach of the telescope; so that, whatever we might thus discover, we may be sure that there is something further still. But let us

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* On the Stomach and Renal Diseases, 3rd edition.

suppose that it were otherwise, and (assuming the molecular hypothesis to be true) that with more perfect organs of sense, or more perfect instruments, we could trace exactly the changes which take place in the arrangement or aggregation of the ultimate molecules of the brain, I do not see that we should be much advanced in knowledge. We should be just as far from identifying physical and mental phenomena with each other as we are at present. The link between them would still be wanting, and it would be as idle to speculate on the nature of the relation between mind and matter, as on the proximate cause of gravitation, or of magnetic attraction and repulsion.

THE FIFTH DIALOGUE.

Mental Faculties of Animals—Their Relation to the Structure of the Brain—Difficulty of the Inquiry, but some Knowledge of it not beyond our Reach—Cerebral Organs connected with the Animal Appetites and Instincts—Organs subservient to the Intellect—Question as to the Uses of the Cerebral Convolutions—The Posterior Lobes of the Cerebrum—The Corpus Callosum—The Development of the Mental Faculties, how far dependent on the Perfection of the Senses, and other external Circumstances—The Nature and Office of Instinct—Intelligence not peculiar to Man, nor Instinct to the lower Animals—Human Instincts—The Social Instinct and the Moral Sense—Some Instincts as necessary to Animal Existence as the Circulation of the Blood, and other mere Animal Functions—Acquired Instincts transmitted from Parents to Offspring—These considered with reference to Moral and Political Science—The Social Instinct viewed as correcting or modifying other Instincts, and as being made more efficient by the greater Development of the Intellect—The Religious Instinct—Primary Truths of Buffier and Reid.

It was one or two days after the conversation which has been just recorded, that we found ourselves in the afternoon, on the side of a hill on which some sheep were scattered, watching the operations of the sheep-dog, who was collecting the flock previously to their being driven home for the night. This led to a conversation respecting the habits and faculties of animals; and Eubulus gave us the history of a dog who, having been taken in a carriage, and by a circuitous route, to a distant place, nevertheless, some time afterwards, found his way back to his former home, having, as it appeared, gone across a tract of country with which he could have had no previous acquaintance.

Ergates. There are very many well-authenticated instances of the same thing. It is even said that dogs carried across the sea have travelled back to their former place of abode, having established themselves on board ship for that purpose. Nor is this faculty peculiar to dogs. I have it on good authority that some foxes which a former Duke of Grafton had caused to be taken from Lincolnshire into Surrey were found some time afterwards in their old haunts in Lincolnshire, their identity being ascertained by certain marks which had been made upon them; and I have read an account of herds of cattle in New South Wales which, having been removed from their accustomed haunts to new pastures at a considerable distance, have nevertheless returned, not by the road which they had gone before, but by going straight across the country, through wilds which they had never traversed previously.

EUBULUS. There are few subjects of inquiry more interesting to man than that of the moral and intellectual qualities of other animals, yet there are few of which we know so little. There are, it is true, a good many scattered observations relating to it; and I may especially refer to the very interesting collection of facts which are recorded in one of Lord Brougham's dialogues.* No one, however, has devoted himself to such inquiries in the same way as many have done to other departments of knowledge. The papers of Frederic Cuvier are truly scientific, and contain much important matter, but they relate to a very limited number of animals. He began the study too late, and died too early, to make any considerable progress in it. Such an investigation is, indeed, attended with peculiar difficulties, and to pursue it with advantage would afford ample occupation, even with the largest opportunities, for the entire term of a man's life.

ERGATES. It may be, as I observed on a former occasion, that some of those beings which are usually regarded as the very lowest form of animal life, have no endowments superior to those which belong to vegetables. Setting these aside, however, I apprehend that no one who considers the subject can doubt that the mental principle in animals is of the same essence as that of human beings; so that even in the humbler classes we may trace the rudiments of those faculties to which in their state of more complete development we are indebted for the grandest results of human genius. We cannot suppose the existence of mere sensation without supposing that there is something more. In the stupid carp which comes to a certain spot, at a certain hour, or on a certain signal, to be fed, we recognise at any rate the existence of memory and the association of ideas. But we recognise much more than this in the dog who assists the shepherd in collecting his sheep in the wilds of the Welsh mountains. Locke and Dugald Stewart following him, do not allow that 'brute animals have the power of abstraction.' Now taking it for granted that abstraction can mean nothing more than the power of comparing our conceptions with reference to certain points to the exclusion of others; as, for example, when we consider colour without reference to figure, or figure without reference to colour; then I do not see how we can deny the existence of this faculty in other animals any more than in man himself. In this sense of the word, abstraction is a necessary part of the process of reasoning, which Locke defines as being 'the perception of the agreement or disagreement of our ideas.' But who can doubt that a dog reasons, while he is looking for his master, whom he has lost; or (as in the instance of which we were speaking just now) when he is seeking his way home over an unknown country?

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* Dissertations on Subjects connected with Natural Philosophy, by Henry Lord Brougham, vol. i. dial. 3.

Crites. But if my recollection be accurate, Dugald Stewart does not mean to deny that brute animals are capable of the simpler forms of reasoning. He merely states that being unable to carry on processes of thought by the help of artificial signs (that is, of language), they have no power of arriving at general or scientific conclusions.*

Ergates. Without doubting for an instant the vast superiority of the human mind, still it appears to me to be difficult to say how far the capacities of brute animals are limited in these respects. It is not to be denied that the aid of language i necessary to the carrying on any long, or complex, process of reasoning. But we see, nevertheless, that those who are born deaf and dumb, and those deserted children, such as Peter the Wild Boy, and the savage of Aveyron, who have never acquired the use of language, reason to a great extent; and, on the other hand, it may well be questioned whether some animals are so wholly unprovided with language as Dugald Stewart supposes.

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* Moral Philosophy, vol. iii. p. 393, edit. 1827.

EUBULUS. I am inclined to believe, with Ergates, that the minds of the inferior animals are essentially of the same nature with that of the human race, and that of those various and ever-changing conditions of it, which we term the mental faculties, there are none of which we may not discover traces more or less distinct in other creatures. Still, in the degree in which these faculties exist, there is a vast difference, not only between what they are in man and in other animals, but in other animals among themselves. And this leads us to another subject, on which I shall be glad if Ergates can give us some information.

It being admitted that the brain is the material organ in connection with the mental principle; and it being also admitted that there is in the different species of animals, on the one hand, a great difference as to the extent of their moral and intellectual faculties, and on the other hand, a not less remarkable difference in the size and formation of the brain; we cannot well avoid the conclusion that these two orders of facts are, in a greater or less degree, connected with each other. I do not mean to infer from this connection that the mind is always the same, and that the greater or less development of it depends altogether on the greater or less perfection of the material organ. It may well be supposed that the original difference is in the mind itself, and that the Creator has so ordained that the brain in the different species of animals should be such as will meet the requirements of the peculiar mind with which it is associated:—a view of the subject which, if I am not misinformed, derives no small support from the researches of modern physiologists. I understand that the embryos of all the vertebrate animals have in the first instance so nearly the same character, that they cannot be distinguished from each other: that starting, as it were, from one common point, the changes which the embryo undergoes differ, not only in different classes, but in different genera and species, as if something were superadded to the physical organisation, by which those changes are regulated, and differently directed, thus giving origin to that immense variety of forms of animal life, which we see everywhere around us. However that may be (and I admit that it is idle, if not presumptuous, to speculate on a subject, as to which we are so entirely without the means of obtaining any actual knowledge), it does not at all affect the question as to the relation which exists between the organisation of the brain and the mental faculties. What I wish to know is, how far does our knowledge of this relation really extend? Is it possible, from any experience that we have of the habits and character of a particular tribe of animals, to predicate what kind of brain we should find them to have on dissection, or from our observations on the latter, to form an opinion as to their moral and intellectual capacities?

ERGATES. To a limited extent this knowledge is within our reach. If two brains were placed before me, in one of which the cerebral hemispheres were largely developed, while in the other they were very little developed, or altogether absent, I should at once pronounce the former to indicate the existence of a much greater intelligence than the latter. But I see no reason to doubt that we might learn more than this; and that an individual, who, in addition to ample opportunities of examining the brains of different animals by dissection, had equal opportunities of studying the habits and behaviour of the same animals while alive, and who himself possessed the necessary qualities for such investigations, might, in the course of time, and after some years of thought and labour, arrive at some very interesting and satisfactory results. If, hitherto, so little progress has been made in this department of knowledge, that is easily accounted for. The combination of opportunities which I have suggested, is of very rare occurrence, and, when it does occur, few persons are qualified to take proper advantage of it. It is, indeed, very far from being a matter of course that the anatomist, who has successfully pursued his own plain matter-of-fact science, should be the one best fitted for observing and comparing the fleeting phenomena of the mind, the study of which, presented as they are to us only through the medium of their external manifestations, must be proportionately more difficult as they differ from the only standard of comparison which we possess in our individual selves.

Eubulus. You might have mentioned another difficulty—that we seldom see other animals in their free and natural state, or otherwise than as being cowed and oppressed by the superiority of man. I suspect that, from this cause, we are led to under-estimate, on the whole, the moral and intellectual qualities of inferior creatures. How little should we know of man himself if we studied him only among the slaves of a Virginia planter! The rook confined in a cage would afford us but little information as to what the rook may be in the republic of his native rookery. The horse tied to his manger in our stables is a very different animal from the horse which is domesticated in his master's family in the Arab's tent; and he must be still more different from him who wanders over the prairies of America under the dominion of his chief. Even if we could live in a colony of rooks, or in a herd of wild horses, not having the means of communicating with them, such as these animals certainly have among themselves, how difficult would it be for us to obtain any real knowledge as to their moral and intellectual condition! How little should we know even of our own species in this respect, if we had not the power of mutually communicating our desires and thoughts through the medium of oral and written language!

Ergates. You will not then be surprised to learn how little has been done towards connecting physical organisation and mental phenomena with each other. The observations of Magendie, Flourens, and some other physiologists, however interesting they may be, throw no light on the more difficult and recondite subject which we are now discussing. There is, indeed, only one fact connected with it which can be considered as well established. Those bodies, situated in the base of the brain, to which in the human subject we give the names of *medulla oblongata*, *cerebellum*, *thalami*, *corpora striata*, and *tubercula quadrigemina*, and the parts corresponding to these in other vertebrate animals, are connected with that class of phenomena which belongs to the animal appetites and instincts; and the two larger masses, which are placed above them, and are known as the cerebral hemispheres, are more especially subservient to the higher faculties belonging to the intellect. The proof of what I have now stated is that in the lower classes of vertebrate animals, in whom the appetites and instincts predominate over the intellect, the first-mentioned bodies form almost the entire brain, and that, very much as the intellect is more developed, so are the cerebral hemispheres more developed also; the degree of their development being more remarkable in man than in any other animal.* Some apparent exceptions to this rule are easily explained. In birds, which are so much more than man, or than quadrupeds, under the dominion of instinct, the cerebral hemispheres appear at first sight to be of great size in proportion to the rest of the brain. But you may recollect that on a former occasion, I explained that they are not so in reality, and that the only part, which can properly be compared with the hemispheres, is a layer of cerebral substance laid on the surface of two other bodies (the *corpora striata*), these being of an enormous size. Again, in some of the cetaceous, and in one or two of the quadrumanous animals, the cerebral hemispheres are so large in proportion to the rest of the body as to approach very nearly to what they are in man himself. But their size is only one of the things to be taken into the account. Although a steam-engine of great power must be of certain dimensions, much will depend on its peculiar construction. So it probably is with regard to the cerebral hemispheres. They consist of two parts, the white, medullary or fibrous substance, which forms the greater portion of their bulk, and the more vascular grey substance, which is expanded on their surface. I stated formerly that the latter is supposed to be the part in which the nervous force is generated; and, therefore, the most important of the two structures. The surface of the hemispheres is formed into folds, or convolutions, and as the fissures by which these are separated are deeper and more numerous, so does the grey bear a larger proportion to the medullary substance. In animals of a very low degree of intelligence, in the kangaroo for example, the convolutions are almost entirely wanting. In man they are more remarkable as to number and depth than in any other animal, and hence some very eminent physiologists, not without some show of reason, have been led to believe that it is by his organisation in this respect that he is adapted to the exercise of that high degree of intelligence which places him at so vast a distance above the rest of the animal creation.*

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* See Additional Note F, page 251.

Whether this hypothesis be or be not well founded, it is to be observed that it is not merely as to its greater volume, and the greater extent of the convolutions of the cerebrum, that the brain of man differs from that of other animals. Comparing it with the brains of the other mammalia (and it is only with these that it much admits of comparison in reality), we find that the posterior lobes of the cerebrum are almost peculiar to the human race. The only other animals in which they exist are those of the tribe of monkeys, and in them they are of a much smaller size than they are in man. The absence of this part of the brain includes the absence of what seems to be a special organ situated in the posterior elongation of the lateral ventricle, known by anatomists under the name of the *hippocampus minor*; and it is worthy of notice, that even in monkeys, who are not altogether without the posterior lobes, this organ is wanting. The *corpus callosum* is the name given to a broad thick band of nervous fibres which unites the two cerebral hemispheres, as if for the purpose of bringing them into harmonious action with each other. In the kangaroo, which I have already mentioned as having a very low degree of intelligence, the *corpus callosum* is altogether wanting. This fact of itself might lead us to conjecture that some important office is allotted to it; and the opinion is confirmed by observations made on the human subject. Cases are on record in which, from an original malformation, this organ was wanting either wholly or in part. In none of them could it be said that the intellectual faculties were altogether deficient. But in all of them there was an incapability of learning, producing an apparent dullness of the intellect, so that the individuals were unfit for all but the most simple duties of life.*

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* See Additional Note G, page 253.

Eubulus. I grant that you have sufficiently established the proposition with which you set out. At the same time it would seem that the organisation of the brain does not indicate the actual extent to which the mental faculties are exercised, nor anything more than the capability of exercising them. Having certain original endowments, which differ in different individuals, the mind is made what it is by the force of external circumstances. How different was that of the savage of Aveyron from what it might have been if he had been trained to early habits of obedience and self-denial, and had been taught to make use of those powers of attention and reflection which God has conferred to a greater or less extent on all of us, but which run to waste if neglected. It is by no means impossible that in some nation of savages there may be an individual with such natural endowments, that, if placed under exactly similar circumstances, he might have become another Newton; and we may be assured that Newton would have been quite different from what he proved to be, if he had been born and bred among the aborigines of Australia. The external circumstances on which the mind more immediately depends are the organs of sense, as it is through them that all knowledge is originally derived, and as without them it would have none of the materials of thought. The mind of an individual who labours under congenital blindness, or congenital deafness, cannot fail to be imperfect as compared with that of others, except where great pains are bestowed on the application of those means which science has furnished for supplying the deficiency; and the imperfection must be greater still in those instances in which these two calamities are unhappily combined.

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* See Mr. Paget's and Mr. Henry's observations in the Medico-Chirurgical Transactions, vols. xxix. and xxxi.

ERGATES. You may extend your observations to other animals, and add, that as among them there is a considerable difference as to the structure and relative value of the organs of sense, so this must be taken into the account if we would form even a rough estimate (and we can form no other) of their mental condition. In birds the eye is a more complicated, and evidently a more perfect, organ than it is in our own species, or in the mammalia generally. The eye of an eagle is nearly as large as that of an elephant; he has a wider range of vision, and can distinguish objects at a distance at which they would be to us altogether imperceptible. In this respect he has means of obtaining knowledge which man does not possess, and so far has an advantage over us. Having the power of ascending to the higher regions of the atmosphere, it is plain that the external world must be presented to him under a very different aspect from that under which it is presented to ourselves. But this is no solitary instance. There are many other animals which have organs of sense more perfect, and many others which have them less perfect, than they are in the human race; and whatever that difference may be, it must lead to a like result by modifying their perceptions, and, if I may be allowed the expression, their notions of things external to themselves.

EUBULUS. We cannot suppose it to be otherwise. The astronomer who contemplates the planets and the Milky Way, and discovers revolving stars and remote nebulæ by means of the telescope, may be regarded, as far as the heavenly bodies are concerned, as being endowed with another sense, so that the impressions which they produce on his mind must be quite different from those which they produce on the mind of the peasant, who knows nothing of them beyond that which is disclosed to his unassisted vision. But how much greater difference would there be if his eye were so constructed that, without the aid of glasses, it answered the purpose of a telescope for distant objects, and of a microscope for others!

ERGATES. The dog distinguishes external objects from each other less by his sense of sight than by his sense of smell, of which last we ourselves make comparatively little use. The whiskers of a cat, each having a special nerve belonging to it, form a much more delicate organ of touch than the human fingers. There is reason to believe that some insects are enabled to take cognisance of the electric state of the atmosphere, as we take cognisance of heat and cold. The eyes of insects are very different from the eyes of the higher classes of animals, consisting sometimes of as many as a thousand hexagonal and transparent plates arranged, not in the same plane, but at angles to each other, so as to form altogether a large portion of a sphere, each having belonging to it what seems to be its own peculiar retina. With eyes such as these the vision of insects must be very different from ours, having an enormous range, with no such distinct picture as is formed on the human retina, and probably affording its possessor less perfect means of distinguishing near and distant objects from each other. On the other hand, the mole has an imperfect eye, and the *mus typhlus*, or subterraneous rat, the *proteus*, and the *siren*, are altogether deprived of the sense of sight. It is plain that the relations of these animals to the external world, and their conceptions of objects external to themselves, must differ according to the difference in their respective faculties of sense.

Still, as Frederic Cuvier justly observes, 'we must not, therefore, exaggerate the influence of the organs of sense on the mental functions: nor can we admit the doctrine which some authors have held, that the perfection of the intellect depends very much on the greater or less perfection of these physical organs.'* This is, indeed, clearly an hypothesis unsupported by facts. The eye and ear of the seal are so constructed that he must have very moderate powers of sight and hearing, and, except through the medium of his whiskers, it may be said that he has no sense of touch at all. Nevertheless, the philosopher whom I have just named, who had ample opportunities of studying the habits of the seals in the *Jardin des Plantes*, describes them as being possessed of intelligence above the average of that which belongs even to the higher classes of the mammalia.*

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* Annales du Muséum d'Histoire Naturelle, tome xvi. p. 54.

Eubulus. The remarks which you have just now made are equally applicable to the hypothesis which some one has advanced, that man is made what he is by the possession of the hand, as a more perfect organ of prehension peculiar to himself; and thus we fall back on your original proposition, that, as far as his physical organisation is concerned, it is in that of the brain alone that we are to look for the evidence of his superiority to other creatures.

Crites. I may now venture to make an observation, which I should have made before, if I had not been unwilling to interrupt the conversation. When you speak of instinct, as contradistinguished to the higher faculties of the intellect, I conclude that you refer to it as a principle by which animals are induced, independently of experience and reasoning, to the performance of certain voluntary acts, which are necessary to their preservation as individuals, or the continuance of the species, or in some other way convenient to them. Now I would ask if it be quite clear that this distinction is well founded? Has it not been the opinion of some physiologists that, by a careful analysis of what are called instinctive actions, they may be traced to the operation of experience, quite as much as those which are more palpably derived from this source?

Ergates. You may refer especially to the first Dr. Darwin, whose great, but too discursive, genius was apt to travel too fast for the cautious pursuits of science. Let me state a few facts, and then leave you to judge for yourself.

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* Annales du Muséum d'Histoire Naturelle, tome xvii. p. 397.

Food is required because life cannot be maintained without it. But no one under ordinary circumstances thinks of this ultimate object. We have an uneasy sensation which we call hunger, and it is merely to remove this sensation that we are led to eat. This is the simplest form of instinct, and it goes far towards explaining others which are more complicated. The desire for food is the same in the newly-born child as in the grown-up man; and when applied to his mother's breast he knows at once how to obtain it by bringing several pairs of muscles of his mouth and throat successively into action, making the process of suction. The newly-born calf needs no instruction to enable him to balance himself on his four legs, to walk, and seek the food with which he is supplied by his mother. The duckling hatched by the hen, as soon as his muscular powers are sufficiently developed, is impelled by the desire to enter the neighbouring pond, and, when in the water, without example or instruction, he calls certain muscles into action, and is enabled to swim. When a sow is delivered of a litter, each young pig as it is born runs at once to take possession of one of his mother's nipples, which he considers as his peculiar property ever afterwards. So the bee prepares his honey-comb, and the wasp his paper nest, independently of all experience or instruction. It is worth your while to refer to the luminous exposition which Lord Brougham has given of the mathematical accuracy with which the former does his work. Yet I do not see that it is at all more marvellous than what we see in the young calf. It would require a profound knowledge of mechanics, and a long investigation, to determine beforehand what muscles should be called into action, and in what order they should act, to enable him to balance himself on his feet, to stand and walk. Yet all this he accomplishes at once, as if it were a mere matter of course. I do not see how these and a thousand other things can be explained on the hypothesis of Darwin, or otherwise than by supposing that certain feelings exist which lead to the voluntary exercise of certain muscles, and to the performance of certain acts without any reference at the time to the ultimate object for which these acts are required.

EUBULUS. It would seem that it is in the proportion which their instincts and intelligence bear to each other that the difference between the mind of man and that of other animals chiefly consists. Reasoning is not peculiar to the former, nor is instinct peculiar to the latter. Even as regards insects, which are generally, and properly, regarded as being below the vertebrate animals in the scale of existence, and whose nervous system is of so simple a structure as to admit of no comparison with that of the human subject, we cannot well hesitate to believe that they are not altogether deprived of that higher faculty which enables ourselves to apply the results of our experience to the new circumstances under which we are placed.

> 'Esse apibus partem divinæ mentis'

is no mere fiction of poetry. It is by instinct that the bee collects his honey, and constructs the hexagonal cells of his honey-comb (always according to the same pattern) from the wax furnished for that purpose by his own secretions. But instinct will not account for all that he does besides. When a swarm is transferred to a new hive placed among many others, at first they are found frequently mistaking other hives for their own, and it is only by experience that they are taught after some time to distinguish the particular hive in which their queen is lodged.* Their habit is to build their honey-comb from above downwards, attaching it to the upper part of the hive. On one occasion when a large portion of the honey-comb had been broken off, they pursued another course. The fragment had somehow become fixed in the middle of the hive, and the bees immediately began to erect a new structure of comb on the floor, so placed as to form a pillar supporting the fragment and preventing its further descent. They then filled up the space above, joining the comb which had become detached to that from which it had been separated, and they concluded their labours by removing the newly-constructed comb below; thus proving that they had intended it to answer a merely temporary purpose. I state this on the authority of a gentleman whose attention has been much directed to these and similar inquiries.

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* Principles of Physiology, by W. Carpenter, M.D., second edition, p. 224.

The observations of M. Dujardin place it beyond a doubt that bees have some means of communicating with each other, answering the purpose of speech. When a saucer containing syrup was placed in a recess in a wall, and a bee conveyed to it on the end of a stick which had been also smeared with syrup, he remained there for five or six minutes, and then flew back to his hive. In about a quarter of an hour thirty other bees issued from the same hive, and came to regale themselves on the contents of the saucer. The bees from the same hive continued their visits as long as the sugar remained in the state of syrup and fit for their purpose, but none came from another hive in the neighbourhood. When the sugar was dry, the saucer was deserted, except that every now and then a straggler came, as if to inspect it, and if he found that by the addition of water it was again in a state of syrup, his visit was presently followed by that of numerous others.*

If even a portion of the observations made by the younger Huber on ants be well founded, these little creatures must be regarded as possessing, in addition to their instincts, no small portion of intelligence. It is observed by a modern writer that 'there is hardly a mechanical pursuit in which insects do not excel. They are excellent weavers, house-builders, architects. They make diving-bells, bore galleries, raise vaults, construct bridges. They line their houses with tapestry, clean them, ventilate them, and close them with admirably fitted swing-doors. They build and store warehouses, construct traps in the greatest variety, hunt skilfully, rob and plunder. They poison, sabre, and strangle their enemies. They have social laws, a common language, division of labour, and gradations of rank. They maintain armies, go to war, send out scouts, appoint sentinels, carry off prisoners, keep slaves, and tend domestic animals. In short, they are a miniature copy of man, rather than that of the inferior vertebrata.'* Of these things which have been thus graphically described, much may indeed be referred to the operation of instincts, or to what Dr. Carpenter terms 'unconscious cerebration;' but surely it involves a considerable *petitio principii* not to refer a part of them to a higher principle, bearing a resemblance, however remote, to human intelligence.

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* Annales des Sciences Naturelles, tome xviii. p. 233.

It would be easy to extend observations such as these to other parts of the animal creation. We see, among the mammalia and birds, even those which are the least intelligent nevertheless availing themselves of the lessons of experience, and adapting their proceedings to the new circumstances under which they are placed; while with respect to the gregarious animals, it is plain that their association could not be maintained unless they had certain rules of conduct among themselves, and the power of communicating their wants and feelings to each other by some kind of language, however imperfect it may be. On the other hand, man, gifted as he is with such (comparatively) vast capacity of memory and reflection—with such powers of observation; having the gift, not merely of language, but of articulate speech, and the use of words—'those shadows of the soul, those living sounds, which render the mere clown an artist—nations immortal—orators, poets, philosophers, divine!' †—by means of which he lays up stores of knowledge, not only for himself and for those now in existence, but also for generations which are to come; living not merely in the present time, but also in the past, and even in the future; whose aspirations lead him to inquiries of a higher nature, beyond the visible and tangible world in which he is placed;—even man, such as he is, is in many respects the creature of instincts; and what would he be without them? As Ergates has already remarked, when he seeks food it is at the moment, not because his reason and experience tell him that he would die without it, but because he is impelled to do so by the uneasy sensations which the want of it occasions. So also is thirst an instinct. The child is attracted to the mother's breast by instinct. The love of the parent for the child, and the desire to avoid danger and prolong life, are instincts also.

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* British and Foreign Medical Review, No. 23, p. 10.

† The Philosophy of Language, comprehending Universal Grammar, by Sir John Stoddart, LL.D., second edition, p. 1. See Additional Note H, page 254.

Man could not exist as a solitary being. He has neither swiftness of feet, nor any natural means of offence and defence, which would enable him to compete with the buffalo, the lion, or the wolf. It would have been of little avail to him if the Creator had left it to himself to learn by hard experience, and any wisdom of his own, that he can procure his own safety, and his means of subsistence, only by associating with others. The desire to live in society is as much an instinct in him as it is in the bee, or the ant, or the beaver, or the prairie dog. Ought not this to settle the disputed question as to the existence of a moral sense? For how could mankind live in society, helping and protecting each other, and joining in common pursuits, if they were not so constructed as to sympathise with each other in their joys and sorrows, and if they did not feel individually that they owe to others what they expect others to offer them in return? Experience and reason, and, if you please, self-interest, tend to confirm, to refine, to exalt these sentiments, but they do not create them. The child is led to seek the society of other children by an impulse which he cannot resist, and which is independent of any intellectual operation. But having done so, his moral qualities, which would otherwise have remained in abeyance, are gradually developed, and (except there be some actual imperfection of the mental faculties) the power of distinguishing right from wrong, justice from injustice, follows, as a matter of necessity, the result of an innate principle, and not of anything acquired.

Crites. All that you have now stated leads to this conclusion, that although it is only as to the higher faculties of the mind that mankind *propius accedunt ad Deos*; that it is only as to these that the Deity has created man in His own image; it is not less true that as to mere animal existence these are of much less importance than the lower faculties of instinct. If the Deity had no other intention than that of maintaining on the surface of the globe a large number of living beings susceptible of enjoyment and indulging in sensual gratifications, with a very small proportion of painful feelings, such intention would have been sufficiently carried out by the creation of animals endowed with imperfect memory, with no capability of experience, with no thought as to the future, and acting solely under the direction of instinct. That the scheme of creation is not thus limited, and that it tends to some ulterior and grander object, we may well conclude from the existence of that principle of intelligence, the dawning of which we observe in the lower animals, and which we find more completely developed in the human race.

Eubulus. It seems, indeed, to be as you have stated, that animals may, and that some animals probably do, exist by means of instinct alone, and without possessing any of the superior intellectual faculties. The converse of this proposition, however, does not hold good, and it is plain that the latter would be quite insufficient unless they were accompanied by instinct. Without it, experience and the anticipation of what is to come, founded on the recollection of the past, would be the only guide, and these of course could not belong to the newly-created or newly-born animal. Indeed, we cannot but suppose that when man first began to exist, and for some generations afterwards, the range of his instincts must have been much more extensive than it is at the present time. We see the infant first deriving nourishment from his mother's breast, but when the period of lactation is over, the experience of his parents supplies him with the fit kind of food derived from other sources. The absence of such experience must, in the first instance, have been supplied by a faculty which he does not now possess (but which we see manifested in the lower animals), directing him to seek that which is nutritious, and to avoid that which is not so, or which is actually poisonous. It is easy to conceive that much besides in the habits and actions of human beings, which seem now to be the results of experience or imitation, was originally derived from instinct; and indeed there are many things which cannot well be explained otherwise. I do not venture to say that from this source he first derived the use of fire; yet it does not seem that in such an instinct there would be anything more remarkable than in that which leads the bee, with the skill of a mathematician, to construct his hexagonal cells; and considering how terrible and destructive an agent fire, if discovered accidentally, must have appeared to be, it is difficult to conceive how uncivilised and untutored man could have been led by mere experience to convert it to the purposes of his own comfort and convenience. It may be further observed that except in the tropical regions of the globe fire is almost as necessary to his existence as food or clothing; and that without it he could not have filled that place which he seems to have been destined to fill in the creation. It was probably under the influence of views similar to these that the Heathen mythologists invented the fable of Prometheus having stolen it from the gods.

On the other hand, if we study the habits of other animals, we cannot doubt that there are many which, however much they are dependent on their instincts, profit also by experience, though in a less degree than man; and it is probable that these, not less than the human species, when first called into existence, were endowed with instincts which they do not now possess.

Ergates. Continuing your line of argument, I may observe that the circulation of the blood, respiration, digestion, the secretion of the kidneys, being immediately necessary to life, are nearly the same under all circumstances, being subject to no material variation except when interrupted by accident or disease. There are certain instincts to which the same observation may be applied. A patient in a lunatic asylum may, as a consequence of his malady, lose the instinct which constitutes the desire for food, so that he would die of inanition if food were not introduced into his stomach by artificial means; or the instinct of self-preservation may be so overpowered, that he commits suicide. But otherwise these particular instincts are as invariable as the functions of the vital organs. There are other instincts which are intended to adapt the animal to the peculiar situation in which he is placed, and liable to vary with the circumstances for which they are required. Acquired habits in several successive generations become permanent, and assume the character of instincts, and thus we have the opportunity of seeing new instincts generated. I walked in the fields during the autumn with a young pointer dog which had never been in the fields before. He not only pointed at a covey of partridges, but remained motionless, like a well-trained dog. M. Magendie relates an analogous anecdote of a retriever. He bought him as a puppy in England, and took him to France. Though never having been trained for the purpose, he knew his duty as a retriever, and performed it sufficiently well when taken into the fields. Mr. Andrew Knight has given an account of other facts of the same kind. It is probable that if we had the opportunity of studying the conditions of the herds of wild horses which roam over the prairies of America, we should find that they are born with instincts which their ancestors did not possess in their domesticated state, and which they would lose if again brought under subjection to man, in like manner as the hens, which in the chicken-hatching ovens of Egypt have themselves been ushered into life under the influence of artificial heat, lose the instinct of incubation, and show no disposition to hatch their own eggs.*

Crites. May not the habit of using the right hand in preference to the left be one of the acquired instincts to which you have referred?

Ergates. Certainly it may be so. But it is at least as probable that it was an original instinct. We know that some individuals are left-handed, but the proportion of them is very small, and I am not aware that there has ever been a left-handed nation. The reason of our being endowed with this particular instinct is sufficiently obvious. How much inconvenience would arise where it is necessary for different individuals to co-operate in manual operations, if some were to use one hand and some the other!

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* The Crescent and the Cross, chap. v., by Eliot Warburton.

However that may be, we must suppose that the conversion of an acquired habit into an instinct is attended with some actual change in the organisation of the brain; and in this there is nothing more remarkable than in many other changes which occur in animals in consequence of an alteration in their mode of life. Thus the thorough-bred horse has more compact bones and a thinner skin than the cart-horse. The elephant which had been preserved in a mass of ice on the borders of the Northern Ocean was covered with hair, which is altogether wanting among his kindred of the South; and still more remarkable examples of changes of this kind may be found among our domesticated animals, especially in dogs.

Crites. This is a subject which is not only interesting as a matter of science, but also of considerable practical importance. Setting aside his physical condition, and the influence of another climate on his health, would the infant born of Esquimaux parents, living in huts of snow, in the dreary regions of the North, be equally fitted with the negro to assume the habits and mode of life of those whose ancestors have resided during many successive generations under a tropical sun, amid the luxuriant vegetation of a tropical climate? or would the infant negro be fitted to undertake the life of the Esquimaux? The negroes of Hayti, who passed at once from a state of slavery into that of freedom and the imitation of civilised life, are already relapsing into barbarism, and returning, in spite of the humanising influence of Christianity, to the superstitions of their African progenitors. In like manner, nations become adapted to the peculiar mode of government under which their ancestors have lived; and experience has shown that it is equally dangerous suddenly to change a despotism for a free constitution, or the latter for a despotism. The original founders of the French revolution had grand objects in view. They saw how much free institutions tend to elevate the character and extend the happiness of mankind, and they had formed a just estimate of the opposite tendency of the former government of their country.

But they overlooked the fact, that no government is good for which those who are to live under it are unprepared, and they failed by attempting too much. If they had been content with beginning the work of regeneration with a prospect of a further but gradual improvement in the course of after-generations, it is probable that their country would never have groaned under the tyranny of the mob, nor have sought refuge from it under the milder despotism of the Emperor. On the same principle it is that civilisation can be only gradually advanced; and that all that the Czar Peter could accomplish was to produce an outward semblance of it in his capital, while the masses of the large population of his empire remained as barbarous as they were before he attempted to force civilisation on them. The sudden emancipation of the negroes in the slave-holding states of America would be productive of nothing but misery and ruin to themselves and the white population; while there is good reason to believe that a different result would follow if they and their masters were gradually prepared for so great a change during even two or three successive generations.

Eubulus. In what you have now said you have in part anticipated some observations which I was about to offer. While the study of instincts in other animals is interesting to the naturalist and physiologist, that of the instincts of the human race is not less interesting to the moral, and, I may add, to the political philosopher. The majority of instincts belonging to man resemble those of the inferior animals, inasmuch as they relate to the preservation of the individual and the continuation of the species. To these the social instinct is superadded, not indeed, peculiar to man, but in him attaining a greater degree of development than in other creatures. This may be regarded as being in many respects antagonistic to the other instincts; and in order that society should exist, it is necessary that the latter should be in a great degree subjected to the former. The first impulse of a hungry man, not less than that of a hungry wolf, is to possess himself of food wherever he finds it. When Dr. Davy, on the bank of the river in Ceylon, found the young alligator just escaping from his egg, the newly-born animal, assuming an attitude of defiance, bit the stick which opposed his progress. So the natural disposition of man is to defy opposition and resent injury. The child who can scarcely walk beats the table against which he has struck his head. The social instinct is intended not to extinguish but to modify and correct his other instincts. But for the attainment of this object it is not in itself sufficient. It requires the aid of experience, education, example, and reason. In proportion as the intellectual faculties are more perfect, so is the social instinct more efficient. The gregarious elephant is more intelligent than the solitary tiger. As the dog is more intelligent than the cat, so has he social and moral qualities which the latter does not possess; and in like manner human society is a more perfect institution than that of any other animals which live in association. Nor must we omit the operation of another cause which mainly contributes to the attainment of that higher degree of civilisation in which the sentiment of duty prevails over the more selfish appetites. The disposition of man, even in his most degraded state, to believe in supernatural agencies is so universal, and so manifestly the result of his peculiar constitution, that we must regard it as having very much of the character of an instinct. As he advances in knowledge and has leisure for observation and reflection, the perception of the beauty, grandeur, and harmony of the universe, of the evidence of intention and design, and of the adaptation of means to ends in everything around him, and of the large amount of good with the small proportion of evil, which is manifested in the condition of all living creatures, leads him to the knowledge of an intelligent and beneficent Creator, to whom he *may* at any rate be responsible for the right use of the faculties with which he is endowed; and thus the religious sentiment becomes engrafted on the rude instinct of the savage. Thus, man as he exists under the best form of civilisation, is made what he is by the operation of various causes. There are his original instincts, without which he could no more have continued to exist than without the action of the heart. There are habits, which, begun in one, and continued in subsequent generations, become confirmed in him, and bear a close resemblance to instincts. These modify and correct each other, and they are all, in a greater or less degree, under the dominion of the intellect. Such is the general view which we must take of his condition; but if we attempt to make a more exact analysis of it, we find the problem too complicated for a satisfactory solution; the various influences to which he is subject being so intermixed with each other, that it is impossible for us to determine in each particular instance how much of his sentiments and conduct is to be attributed to one of them, and how much to another.

Crites. You have referred to the disposition of human beings to believe in supernatural agencies as partaking of the character of instincts. If you are correct in so doing, it seems to me that you may with equal reason include in the same category our belief in the existence of a material world; our belief that what we remember as having happened, did really happen; in short, in all that some have intended to describe under the name of innate ideas, and that Buffier, and Reid after him, regarded as primary and fundamental truths; the knowledge of which is forced upon us by our own constitution, and is independent of experience and reasoning. Now, although I do not admit the exactness of the catalogue of these primary truths, which has been furnished by the writers whom I have mentioned, and, indeed, do not doubt that they have included in it some kinds of knowledge which are derived from other sources, yet I do not dispute the correctness of their general views; and, indeed, it is plain that it has been practically admitted by even the most sceptical of those philosophers who have written on the subject. But are we really justified in regarding such kinds of belief as being of the nature of instinct?

Eubulus. They differ from instincts in one very essential circumstance. It has been shown that instincts are far from being constant and immutable; as under a change of circumstances certain instincts are lost, so are others generated. Even those which are of the greatest necessity, which seem to be the most constant, may, under certain circumstances, be found to be wanting in an individual in whom they had been fully developed previously. But it is otherwise with those articles of primary belief which are represented as the foundation of all our knowledge. However the lunatic may be deceived by his illusions, or however convincing the arguments of the metaphysician, neither the one nor the other can escape from the belief that there is an external world independent of himself, or that what he remembers to have happened did actually occur. Taking these things into consideration, it seems not unreasonable to suppose that this class of convictions has some higher source than that which belongs to mere instincts, and that they are actually inherent in the mental principle itself, and independent of our physical organisation.

THE SIXTH DIALOGUE.

Views of Human Nature—The Science of Human Nature—its Objects and Applications—to be distinguished in its higher Department from the mere Practical Knowledge of Human Character which Men acquire for their own Purposes—Different Opportunities of pursuing the Study of Human Nature presented to different Individuals—The Observation of the Influence of the Body on the Mind, and of the Mind on the Body, a necessary Part of it—The Science of Human Nature essential to the Science of Government—The Pretensions of Phrenology—Anatomical Objections to it—Observations on the Evidence on which it rests—Consideration of the Question as to the Relation of the Size of the Brain to the Development of the Intellect—General View of the Circumstances which tend to form or modify Men's Characters—The Science of Human Nature not reducible to any Simple Rules—Qualifications necessary for the Pursuit of it—Self-knowledge—Duties and Responsibilities—Conclusion.

THE term which we had allotted for our visit was drawing to a close. On the day preceding that of our departure, after wandering for some time exposed to the rays of an August sun, we found ourselves enjoying the shelter of the beech wood, which I have already mentioned as being in the neighbourhood of our friend's habitation. A tree which had been lately felled afforded us a seat. The cool shade was refreshing to us after the glare and heat of the sunshine in the open country; and the stillness and silence which prevailed afforded us the opportunity of renewing our conversation on subjects connected with those which we had discussed previously.

'It is probable,' said Crites, 'that such feelings might not be of long duration; but I own that at the present moment the scene which is before me forms a delightful contrast to the bustle and activity of my every-day life; and that it seems that I should be well contented to escape from the turmoil of the world, and the anxieties of a profession, and pass the rest of my days in some such retirement as this,—

> 'The world forgetting, by the world forgot;'

exchanging the study of the vices, caprices, and vagaries of mankind, for that of books and the contemplation of the beauties of the country.'

EUBULUS. You judged rightly in saying that these feelings might not be of long duration. I can assure you from my own experience, that such a mode of life as you seem to contemplate would never satisfy you unless you were to combine with it some worthy pursuit appertaining to others as well as to yourself. You would, if thus living only for yourself, soon find the social instinct of which we were speaking yesterday, as irresistible as that of hunger; so that you might as well pretend by a process of reasoning to abstain from eating if you were famished, as from seeking the society of your fellow-creatures, when you had been for some time deprived of it.

Further, it seems to me that you are not like your usual self, and that you do not quite do justice to mankind, when you refer merely to their vices, caprices, and vagaries. It is true that of these there is much in their composition, which we might well wish to have been otherwise; but let us not overlook the numerous examples which we meet with, of kind and generous actions, of sacrifices of self-interest made for the good of others, in private and sometimes even in public life. I have now lived long in the world, and have been mixed up with various classes of persons; and I may truly say that, although I have met with evil more than enough in others, and am not, I hope, altogether insensible of my own defects and failings, my individual experience has led me to entertain, on the whole, a better opinion of mankind than that which I should have had if I had studied the subject only in books. I speak, be it observed, of moral qualities. As to those of the intellect, I own that some time since, when I had the opportunity of passing an evening in the company of two lads belonging to the aborigines of

Australia, I was lost in wonder, and could scarcely comprehend that these rude beings should belong to the same race with some others with whom it has been my good fortune to be acquainted; so full of knowledge; penetrating into the mysteries of the material world; subjecting the physical forces to their will; at the same time analysing the phenomena of the mind itself; and ascending from thence to some knowledge, however limited, of the one Supreme Intellect which supports and regulates the universe. To us, situated as we are, with our duties and in our sphere of action, there is, I apprehend, no more worthy object of study than man himself; his instincts and higher faculties, his past history, his future destiny; in short, the 'science of human nature' taken in its most extended sense. And in this sense it is a most extensive science indeed, including as it does anatomy and physiology; intellectual, moral, and political philosophy; ethnology, and I know not how much besides. Even the most abstract sciences, though not directly, are indirectly related to it, as we value them only in proportion as they tend to gratify the curiosity, supply the necessities, or elevate the character of man. As we commonly understand it, however, the science of human nature has a more limited signification, implying a knowledge of the instincts, the passions, the intellectual capacities, the active power of our species, and, above all, the motives by which the conduct of individuals is regulated.

Crites. Such as you have now described it, it may be said to be a science, which belongs to every individual among us as to the philosopher, dependent as we are on each other, and compelled as we are to learn something of the characters of those with whom we associate. The rich man's valet studies his master's tempers and caprices, learns to anticipate his wants; in those matters in which he is himself concerned, saves him the trouble of acting and even of thinking for himself; and thus at last acquires an influence over him, which is not the less real because his master is unconscious of it. The statesman, the lawyer, the merchant, the medical practitioner, the speculator, these and others, in their several ways, study the disposition of other men, as far as it is necessary for them to do so, with a view to their own advantage, or to enable them better to perform the duties belonging to their respective callings.

EUBULUS. It seems, however, that we are scarcely justified in dignifying the practical knowledge of human nature which men generally possess with the title of a science. For the most part they view it under only one of its numerous aspects; the sight of each individual not extending beyond the little clique to which he himself belongs; and there are none to whom this remark is more generally applicable than to those, who, independent of their own exertions, are born to the inheritance of ease and affluence. Those who study human nature as a whole form an exception to the general rule. Some have not the talent of observation; others have not the necessary leisure; and of those who are not wanting in these respects the greater part have not the inclination to do so.

CRITES. You may add that many have not the opportunity. Inquiries such as these cannot be carried on in a closet. They belong altogether to active life. Then be it observed that in some situations you come in contact only with a particular class, while in others the field of observation is more extensive. It seems to me that medical practitioners, if they know how to avail themselves of it, have in this respect an advantage over most other professions; partly, because they have to deal with every order in society, from the high-born patrician and prosperous millionaire, down to the poor man in the hospital, seeing them as they really are, under those circumstances of trial, which, more than anything else, level all artificial distinctions; but more especially, because they are necessarily led to contemplate the mind, not simply in the abstract, as is the case with the mere metaphysician, but in connection with the physical structure with which it is associated.

ERGATES. Certainly the opinion which you have now expressed seems not to be without foundation. It is the business of medical practitioners to study, not only the influence of the mind on the body, but also that of the body on the mind; and, in so doing, they have the opportunity of learning more than others to trace moral effects to physical causes. To them, human nature, however it may be disguised, is but human nature still; the high and mighty of the earth differing, in nothing that is essential, from the obscure and humble. Where others complain of a fretful and peevish temper, it may be that they are led to make allowance for the difficulty of self-restraint, where there is a superabundance of lithic acid in the blood, or an organic disease of the viscera. In the catalepsy induced in a nervous girl by the so-called mesmeric passes, they see only one of the numerous phases of that multiform disease, hysteria; and in the mischievous, and sometimes even in the benevolent enthusiast, who, by his sincerity and earnestness, enlists in the cause which he undertakes the sympathy of the multitude, their more experienced observation will often detect the commencement of illusions and the germ of insanity.

It would, however, be a very great mistake to regard this kind of knowledge as being altogether peculiar to medical practitioners. In fact the connection between the mind and body is in many instances too palpable to be overlooked by any practical observer of mankind. For example, it is referred to by Lord Chesterfield, when he says that many a battle has been lost because the general had a fit of indigestion; and you may recollect that I stated on a former occasion that Mr. Chadwick has clearly exposed the influence of living in an unwholesome atmosphere as inducing the habit of gin-drinking with all the frightful moral consequences which follow in its train. Still it must be admitted that members of the medical profession have better opportunities of obtaining knowledge of this kind than most other persons. Hence it is that in many things which, in these days of education, and in spite of the advancement of knowledge, others regard with wonder as the result of some unknown and mysterious agency, they, with some rare exceptions, see nothing that is not to be explained on well-known principles, or in any degree more remarkable than the exploits of M. Robin or other conjurors.

Eubulus. Some may pursue the inquiry with more or less of a philosophical spirit, and others merely as a matter of practical observation and experience; but Crites has truly stated that some knowledge of human nature is necessary to all those who have any duties (however small) to perform in society, and the higher and more arduous these duties are, the greater is the amount of knowledge that is required. It forms the most essential part of the science of government, and to the want of it may be attributed many national calamities, and the greater part of the mistakes made by those to whom the affairs of nations are entrusted. The principal advantage possessed by an adventurer such as Cromwell, or the first Napoleon, is, that he cannot have risen by his own exertions through the various grades, which he has occupied in the course of his career, associating with others on equal terms, without acquiring an insight into men's minds and characters, which it would not have been possible for him to have acquired otherwise. The unhappy Louis XVI. and Marie Antoinette, surrounded as they had been by the etiquette, and misled by the adulation of a Parisian court, received almost their first lessons in human nature from the brutal frenzy of a revolutionary mob. How different might have been the result, both for themselves and for Europe, if they had enjoyed a more familiar intercourse with their fellow-creatures; or if, at the head of a constitutional government, they had had the opportunity of seeing the thoughts and feelings of the public and the spirit of the times reflected by an independent press! The Great Duke, if he could have had an army such as he required, made to his hand, might, by his military skill, have been a successful general, and 'the conqueror of a hundred battles,' but it would have been still a problem how that army had been created, and how he surmounted the various difficulties which he had to encounter, if the publication of his despatches had not disclosed to us the great insight which he possessed into the moral and intellectual qualities of others. A statesman may form grand conceptions in his closet, but these will be of little avail if he knows not how to select the right men to carry his plans into execution;

or if, overlooking, or being ignorant of, the various characters of the different races of mankind, he applies to one of them a mode of government which is fitted only for another.

Crites. From the way in which you treat the subject, I suspect that you have disregarded, or at any rate are not a convert to, the doctrines of phrenology. Nevertheless, among my friends I am acquainted with some, and those too persons of much intelligence, who believe that these afford a sort of Royal road to a knowledge of men's dispositions and characters; and I well remember that, some years ago, when Lord Glenelg occupied the situation of Colonial Secretary, a memorial, signed by many persons of repute, was addressed to him, seriously proposing that he should adopt the phrenological method of investigation, with a view to a classification of the convicts before they were transported to the colonies; it being further proposed that an experienced phrenologist should be taken into the service of the State, for the purpose of making the necessary examination of their heads.

I do not mean to say that I am myself either a believer or an unbeliever in the system; and I am led to mention it chiefly because Ergates, who has attended more than I have to questions of this kind, seemed, in one of our former conversations, to admit that there may be some foundation for these doctrines, when he expressed an opinion that the brain is not a single organ, but a congeries of organs, each having its peculiar function allotted to it.

Ergates. Such, certainly, is the conclusion at which I have arrived, and which seems to derive confirmation, both from the anatomical structure of the brain, and from the observations of experimental physiologists. But you must not, therefore, suppose that I have the smallest faith in what is called phrenology, which is quite a different matter. The phrenological theory is, that of the various instincts, dispositions, and talents, each has a separate organ allotted to it; that these organs, with only a single exception, are situated in the hemispheres of the cerebrum; that, in proportion as they are more or less developed, so is there a greater or less development of the faculties or qualities which they represent; that by the external figure of the head the relative size of these various organs may be ascertained; and, lastly, that we have thus afforded to us the means of determining the characters of individuals, so as to form a pretty accurate notion of what their future conduct will be, independently of all experience as to their conduct formerly. Now, there are two simple anatomical facts which the founders of this system have overlooked, or with which they were probably unacquainted, and which of themselves afford a sufficient contradiction of it.

1st. They refer the mere animal propensities chiefly to the posterior lobes, and the intellectual faculties to the anterior lobes of the cerebrum. But the fact is that the posterior lobes exist only in the human brain, and in that of some of the tribe of monkeys, and are absolutely wanting in quadrupeds. Of this there is no more doubt than there is of any other of the best-established facts in anatomy; so that, if phrenology be true, the most marked distinction between man, on the one hand, and a cat, or a horse, or a sheep, on the other, ought to be, that the former has the animal propensities developed to their fullest extent, and that these are deficient in the latter.

2ndly. Birds have various propensities and faculties in common with us, and in the writings of phrenologists many of their illustrations are derived from this class of vertebral animals. But the structure of the bird's brain is essentially different, not only from that of the human brain, but from that of the brain of the mammalia generally. That I may make this plain, you must excuse me if I repeat what I said on the subject formerly. In the mammalia, the name of *corpus striatum* has been given to each of two organs of a small size compared with that of the entire brain, distinguished by a peculiar disposition of the grey, and the fibrous, or medullary substance, of which they are composed, and placed under the entire mass of the hemispheres of the cerebrum. In the bird's brain, what appears to a superficial observer to correspond to these hemispheres is found, on a more minute examination, to be apparently the *corpora striata* developed to an enormous size;

that which really corresponds to the cerebral hemispheres being merely a thin layer expanded over their upper surface, and presenting no appearance of convolutions. It is plain, then, that there can be no phrenological organs in the bird's brain corresponding to those which are said to exist in the human brain, or in that of other mammalia. Yet birds are as pugnacious and destructive, as much attached to the localities in which they reside, and as careful of their offspring, as any individual among us; and I suppose that no one will deny, that if there be special organs of tune or of imitation in man, such organs ought not to be wanting in the bullfinch and parrot.

Eubulus. I do not pretend to have much knowledge of anatomy, but even without it—from the perusal of the writings of Spurzheim and some other phrenologists—I had come very nearly to the same conclusion with that which may be deduced from the facts mentioned by Ergates. It seems to me that the classification of faculties which these writers have made is altogether artificial, and that it is not at all reasonable to suppose that for each of these a special material organ must be required. If we admit the separate existence of the thirty-three faculties, or propensities, enumerated by Spurzheim, we might with equal propriety admit the existence of many others, for which, however, the phrenological map of the head leaves no vacant space.

Then, when I consider the evidence on which the determination of the seat of the several organs is founded, I can conceive nothing more fantastic or unsatisfactory, or more unlike that which is considered to be necessary to the formation of just conclusions in other sciences.

Sometimes the seat of a particular organ is ascertained by a particular part of the head being warmer than the rest. It was thus that Dr. Gall was first led to detect the seat of the sexual passion in the cerebellum.* But is it really the fact that one part of the head is warmer than another if they are equally covered or uncovered? Was it ever found to be so by a delicate thermometer? or is it at all probable that so much more heat should be generated in one portion of the brain than is generated in other parts, as to be perceptible through the bone and skin, and the hairy scalp?

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* See Additional Note I, page 257.

The organ of philoprogenitiveness, by which parents are impelled to love their offspring, is said to be placed in the back part of the head, in the posterior lobes of the cerebrum, immediately above the cerebellum. Now observe in what manner this discovery was effected. Dr. Gall found a protuberance in this part of the heads of women, and for five years he meditated on the subject, but could advance no farther. At last he discovered a similar protuberance in the heads of monkeys. The question then arose, what is there in common between women and monkeys? At this point he obtained the assistance of a clergyman, who observed that monkeys are very fond of their offspring, and thus solved the difficulty: the conclusion at which he had arrived being afterwards confirmed by the following circumstance:—A woman in whom this part of the head was unusually prominent, being ill of a fever, and (we may suppose) delirious, believed herself to be pregnant with five children.

I shall trouble you by giving another example of the manner in which these researches were conducted by the two founders of the phrenological system. They are both of opinion that the organ of pride is situated in the back part of the head, and hence it is, as Dr. Spurzheim has observed, that 'all the motions of pride take place in the direction upwards and backwards.' But Dr. Gall further believes that it is the greater development of this organ which leads certain animals to prefer to live in elevated situations. Thus there is a proud rat which lives in hay-lofts, and in the attic story of a house; and another, a humble rat, which is content to grovel in cellars and gutters. It is under the same influence that certain children and little men display a proud disposition by climbing on the backs of chairs, and that kings and emperors are seated on elevated thrones.

Crites. I do not undertake to defend such far-fetched illustrations as those to which you have referred; and I am ready to admit that even those which are offered by Mr. George Combe (though his phrenological treatise displays very much more of a philosophical spirit than those of his predecessors) partake too much of the same loose and unscientific character. Being no anatomist, I cannot venture to make any observations on the anatomical statement which has been made by Ergates. Still, setting aside all other considerations, if it be true that there are persons who, from the examination of the shape of a man's head, can form a pretty accurate notion as to his character, however the fact is to be accounted for, there must be something more than what is merely fanciful in phrenology. Facts are not to be rejected merely because the explanation offered of them proves to be erroneous; and I have not only heard of them from others, but have myself known instances of such shrewd observations on character made by phrenologists that I can scarcely believe them to have been purely accidental.

Eubulus. I do not in the least doubt the accuracy of your statement; and indeed I might refer to a part of my own experience in its favour. But I might also refer to still more numerous instances in which the phrenological examination of the head has proved to be a failure. You may perhaps regard me as being in some degree a prejudiced witness, and I will therefore merely refer you to an account, published some years ago, of the visit of Dr. Gall, the inventor of the science, to Sir Francis Chantrey's studio, when he pronounced the head of Sir Walter Scott (who had not the smallest turn for mathematics) to be that of a great mathematician; that of Troughton, the mathematical instrument maker, to be the head of a poet; and at the same time discovered the indications of a superior intellect in another head, the living proprietor of which had certainly as little claim as any man could possibly have to be thus distinguished.

But even if the errors of phrenology were less numerous than I believe them to be, that would not go far towards convincing me of the value of their art. It is not very difficult for a clever observer of human nature to form a notion of some part of a man's character in the course of a brief conversation with him; and an enthusiast in phrenology may very honestly persuade himself that he has obtained from the examination of his head that knowledge which he has really obtained from other sources. Then observe how comprehensive the faculties and propensities of the phrenological system are supposed to be. A large development of the organ of destructiveness in the head of Hare the murderer, explained how it was that he was led to murder sixteen human beings that he might sell their bodies.* But in the head of another person who never committed a murder, it is sufficient to find that it exists in combination with a disposition to satire, or to deface mile-stones; and in the beaver and squirrel, it explains how it is that these animals are impelled to cut and tear in pieces the bark, leaves, and branches of trees, for the innocent purpose of constructing their cabins and nests. So the large size of the organ of acquisitiveness not only leads one person to be a thief and another to hoard, but it also explains the habits of the spendthrift (who does not hoard at all); and it impels storks and swallows to return after their migrations to establish themselves each succeeding year in the same locality. Following these examples, I do not see that a phrenologist can be much at a loss in finding a character for any individual suited to the peculiar configuration of his head. But observe further, if a difficulty were to occur, how easily it may be explained away by an ingenious phrenologist. If ever there was a race of thoroughly remorseless murderers in the world, such were the Thugs of India. Generation after generation they were born and bred to murder. They looked to murder as the source not only of profit but of honour. Dr. Spry sent the skulls of seven of these demons, who had been hanged at Saugor, to some phrenological friends in Scotland. To their surprise, destructiveness was not a predominant organ in any one of them. But the anomaly was soon explained. The Thugs, it was said, had no abstract love of murder, but murdered for the sake of robbery.* It would not be easy to show that there was any difference between the Thugs and Hare, or Burke, or Bishop, in this respect.

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* A System of Phrenology, by George Combe, 5th edition, vol. i. p. 262, &c.

Ergates. After what I have already said, you will scarcely suspect me of being a convert to the doctrines of phrenology. We must not, however, lose sight of the facts, that idiots for the most part have small heads, and that we are generally agreed in considering a large head and a capacious forehead as indicative of superior intellectual endowments. In like manner as the ancient sculptors gave to the figures of some of the Heathen Gods the appearance of youth, by shortening the jaws so that they could not be supposed to contain the entire number of teeth belonging to the adult, so they expressed the Divine Intelligence of others by increasing the dimensions of the forehead. But even to this rule there are exceptions. Some very stupid persons, within my own knowledge, have had very large heads. On the other hand, if we may trust to the authority of the bust of Newton, in the apartment of the Royal Society, the head of that mighty genius was below the average size: and Moore describes the head of Byron as having been unusually small, with a narrow forehead, the fact being confirmed by an anecdote related by Colonel Napier, of a party of fourteen persons having tried to put on his hat, and having found that it was too small to fit any one of them. On a former occasion I adverted to an hypothesis by which these anomalies may be explained. The nervous force is supposed to be generated in the grey or vesicular substance, of which the greater part is expanded on the surface of the cerebral hemispheres, the extent of that surface depending not so much on the bulk of the entire brain as on the number and depth of the convolutions. Without, however, having recourse to this explanation, it is easy to suppose that a more or less refined organisation may make all the difference, so that the smaller brain of one individual may be a more perfect instrument for the mind to use than the larger one of another.

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* India, Pictorial and Historical, London, 1854, p. 356.

Eubulus. Men's characters are indeed compounded of so many elements, and are influenced by so great a variety of circumstances, that it is difficult to understand how they can be determined by any such simple rules as those laid down by the phrenologists.

First, there are those original and necessary instincts, without which the human race could not exist at all, but which are nevertheless, in like manner as the higher or intellectual faculties, more complete and of greater intensity in some individuals than they are in others. Then there are those habits which are gradually acquired during several successive generations, by which chiefly the different races of mankind are distinguished from each other, which cause one nation to be peaceful and another warlike; which engender low-mindedness and cunning in those who have had an uncertain tenure of life or liberty, or property, under an arbitrary and oppressive government, and give rise to liberal sentiments, and an open and manly bearing in those who have had the advantage of belonging to a free and well-regulated community. To these we may add those other habits and modes of thinking which are the result of early discipline and training in individual cases; which dispose him who has been brought up among thieves to become a thief; which caused the spoiled child, whatever his original disposition may have been, to grow up into the selfish man; which explain how it is that of two persons with the same amount of natural talent, one remains from the beginning to the end of his life absorbed in frivolous pursuits, and dies unregretted, or perhaps despised; while the other is distinguished for his genius and superior intellectual attainments, transmitting his name to posterity as that of a benefactor of the human race. If we pursue the inquiry further, we find that in addition to moral agencies such as I have enumerated, there are various physical agencies which co-operate with them in forming individual characters. One man is in that state of bodily health, that even in spite of adverse circumstances he is always cheerful and contented, ready to sympathise with others, and obtaining their sympathy in return. Another oppressed by chronic dyspepsia, or visceral disease, or having his nervous energies exhausted by excessive labour, is in that condition which causes every impression made on him to be attended with more or less of an uneasy feeling; and hence he is fretful and peevish, doubtful as to himself, suspicious of others; so that it is only under the influence of a high moral principle, and by a constant effort of self-control, that he can avoid being ungracious in his general behaviour, and, in his dealings with mankind, bring himself up to the level of his more fortunate competitor. Nor are physical agencies of another kind less influential in other ways. It cannot be supposed that the young gentleman of fashion, whom I remember to have seen described in one of the police reports as never being without a cigar in his mouth, except when he was at his meals, or when he was asleep, had any other than a muddled intellect; and the alcohol circulating in the vessels of the habitual drunkard must have even a more injurious influence than the poison of tobacco. We may carry our inquiries further still, and in doing so we find the problem to become still more complicated. How often does it happen that the character alters as years advance! The young man who enters on his career in the possession of what are called great worldly advantages, full of hope, flattered by those around him, and expecting of life more than life can bestow, incurs a great risk of becoming in the end a disappointed misanthrope. So the spendthrift of one period may be the miser of another; and he, whose early efforts obtain for him the reputation of superior intelligence, not unfrequently ends where he began, having allowed his talents to run to waste, and never accomplished anything afterwards by which he might be distinguished from the herd of ordinary mortals.

Ergates. You may include in the same category the changes which take place in advanced life, and which are undoubtedly to be attributed to an altered condition of the brain; beginning with the imperfect recollection of late events, and ending with that more complete failure of the memory, which seems to be the true, as it is the all-sufficient, explanation of the fatuity occasionally met with in extreme old age.

EUBULUS. There can be no question as to the occurrence of the changes which you mention. But it is worthy of notice that, while in old age the recent impressions on the memory are evanescent, it is quite otherwise as to those which were made formerly; and hence it is that the old man, whose mind wanders when he speaks of what has happened to-day or yesterday, may be quite clear and coherent when he goes back to the scenes of his early life; and that it is on these especially that he loves to dwell during the day, while they form almost the entire subject of his dreams at night. At the same time my own observations lead me to believe that the failure of the mind in old age is by no means a constant occurrence, and is often more apparent than real. The old man is not stimulated by ambition, as when he felt that he might have many years of life before him. He has probably withdrawn from his former pursuits, and has substituted no others for them; and we know that the mind as well as the body requires constant exercise to maintain it in a healthy state. Where it is still occupied we frequently find it to survive the decay of the body, retaining its energy and vigour even to the last.

The further we extend our inquiries in this direction, the more difficult it seems to understand how any simple rules can be laid down for explaining and determining men's characters. It has been reported of a celebrated prime minister of the last century, that he held every man to have his price. The anecdote may or may not be true; but if it be so, the answer to such an ungracious doctrine is sufficiently obvious. He drew his conclusions from a too limited experience, and did not bear in mind that those who had not their price were just the persons with whom it was least likely that he should come in contact. Adam Smith has been, to a considerable extent, successful in referring to that involuntary sympathy (or instinct) which causes us to participate in what is felt, or what we suppose to be felt, by others, as the foundation of our moral sentiments. But this simple and beautiful theory does not explain the whole. It overlooks the disturbing influences arising out of peculiarities of the physical organisation; and it has not sufficient reference to the intellectual faculties, which in all the concerns of life are so mixed up with the moral sentiments, each influencing the other, that to study either of them separately is as useless as it would be to study geology without reference to chemistry and mineralogy; or the phenomena of the living body disregarding the laws which operate on inorganic matter. What I have ventured to call 'the science of human nature' is a department of knowledge in which I will not say that we recognise no leading principles, but in which we recognise none that will supersede the necessity of minute observation, and an extended individual experience. For all practical purposes the study of it must be conducted very much in detail, and no man can make much progress in it whose views are limited to one variety of the human species, or to one class in society; or whose situation is such that he is merely a looker-on, and not himself an actor in the busy drama of life.

Crites. You may add that whoever would understand the minds of others, and exercise a useful influence over them, must first understand himself. He who forms a wrong estimate of his own capabilities, of his own prejudices, and of the weak points of his own character, measures the characters of others by an erroneous standard. Not only is he in constant danger of undertaking that which he is not qualified, and of neglecting that which he is qualified to perform, but he is at the mercy of others who, although they may very probably be inferior to himself in some of the nobler qualities, obtain a dominion over him by studying his defects, and making them subservient to their private purposes.

Eubulus. Whatever they may have been otherwise, the priests of the Delphic Oracle were certainly no impostors when they displayed that simple but significant inscription *Γνωθι σεαυτον* over the portico of the temple of the heathen god. If self-knowledge be important as the first step towards a knowledge of the characters of others, on other grounds it is more important still. Though we may admit, with Ergates, that the mental principle must be of the same essence, under whatever form it exists, still there can be no question as to the vast superiority of the mind of man to that of all the created beings by whom he is surrounded. But in what does that superiority consist? Other animals, and more especially the gregarious, are not without an ample share of the moral sentiments. We see them displayed in the dog, who rejoices in being your companion, and who flies to your assistance if you are attacked; in the attachment of the elephant to his keeper who treats him kindly, and in his resentment of injuries; in the roebuck, who pines and dies if separated from his mate; and even in the cat, who, peaceful at other times, turns round on you in anger if you interfere with her kitten. It is not as to these, but as to his intellectual faculties, that there is so vast a difference between man and other animals, that none can be said even to approach him in this respect. But this distinction is not without its price. It imposes on him duties of a higher order, and greater responsibilities. He is required not to yield to the impulse of the moment, but to look to the more remote consequences of what he says and does; and to keep not only his instincts and passions, but even his thoughts, in subjection to his will. Nor can this be rightly accomplished by any one who does not regard his own powers, his own disposition, and his peculiar moral temperament, influenced as it is by his physical condition and his mode of life, as a fit object of study, even more than anything external to himself. This brings us to other inquiries of the highest interest, involving as they do so much of what is of the greatest importance to ourselves and others; inquiries which have not been neglected by heathen philosophers, but which assume a more exalted character when pursued by those who, under the influence of a purer faith, feel that they are answerable to one almighty power for the right use of the faculties with which they are endowed. But on these we have no leisure to enter at present. Whatever may be the value of our discussions, from the arrangements which you, my friends, have made, we must consider them as closed.

‘*Quæ cum essent dicta, finem fecimus et ambulandi et disputandi.*’

ADDITIONAL NOTES.

NOTE A. Page 133.

THE following eloquent passage, extracted from Dr. Newman's lectures, will be read with interest in connection with the observations of Sir Walter Scott and Sir Humphry Davy, referred to in the text:—

Self-educated persons 'are likely to have more thought, more mind, more philosophy, than those earnest but ill-used persons, who are forced to load their minds with a score of subjects against an examination; who have too much on their hands to indulge themselves in thinking or investigation; who devour premiss and conclusion together with indiscriminate greediness; who hold science on faith, and commit demonstrations to memory, and who too often, as might be expected, when their period of education is passed, throw up all they have learned in disgust, having gained nothing by their anxious labours except, perhaps, the habit of application.

'Yet such is the bitter specimen of the fruit of that ambitious system, which has of late years been making way among us. But its results on ordinary minds, and on the common run of students, is less satisfactory still. They leave their place of education simply dissipated and relaxed by the multiplicity of subjects, which they have never really mastered, and so shallow as not even to know their own shallowness. How much better is it for the active and thoughtful intellect, where such is to be found, to eschew the college and the university altogether, than to submit to a drudgery so ignoble, a mockery so contumelious! How much more profitable for the independent mind, after the mere rudiments of education, to range through a library at random, taking down books as they meet with them, and pursuing the trains of thoughts which his mother wit suggests! How much healthier to wander into the fields, and there with the exiled prince to find "tongues in the trees, books in the running brooks"! How much more genuine an education is that of the poor boy in the poem,—a poem, whether in conception or execution, one of the most touching in our language,—who, not in the wide world, but ranging day by day round his widowed mother's home, a dexterous gleaner in a narrow field, and with only such slender outfit

'As the village school and books a few supplied,'

contrived, from the beach, and the quay, and the fisher's boat, and the inn's fireside, and the tradesman's shop, and the shepherd's walk, and the smuggler's hut, and the mossy moor, and the screaming gulls, and the restless waves, to fashion for himself a philosophy and poetry of his own!'

NOTE B. Page 138.

THE question referred to in the text has been well stated by an accomplished friend of the author.

'The advocate for an immaterial principle is often unjust to his argument, in his assiduity to rid himself of those facts which attest the close and constant action of matter upon mind. They are too palpable, not only in matters of sense, but also as regards the purely mental processes, to admit of any evasion. His true doctrine lies beyond this; in asserting a principle submitted indeed to these influences, but different from them; capable of independent changes and actions within itself; and, above all, capable of self-regulation in those functions of thought and feeling to which external agents minister in the various processes of life. The ministering agents may become disturbing ones, and such they frequently are to a singular extent. But in this we have no proof of identity. Whatever of reason we can apply to an argument insuperable by human reason is against it; and the record of such instances is wholly comprised within that one great relation, which pervades every part of our present being; but the intimate nature of which is a sealed book to human research.'—*Medical Notes and Reflections*, by Sir HENRY HOLLAND, Bart., M.D.; 2nd edit. p. 461.

Those who are curious in inquiries of this nature will do well to refer to another work by the same author, *Chapters on Mental Physiology*, especially to the chapters which relate to sleep, dreams, and insanity.

Note C. Page 155.

If a comparison of the effects produced by various stimulant and narcotic agents on the nervous system be interesting to the physiologist, it ought not to be less so to the moral philosopher and the statesman.

At one period opium was much in request among the inferior classes of the metropolis, and there were chemists who disposed of many boxes of opium pills on a Saturday night. Then gin became cheap; the gin-palaces arose, and opium was neglected. This was greatly to the advantage of the revenue. But was it of advantage to society? The effect of opium when taken into the stomach is not to stimulate, but to soothe the nervous system. It may be otherwise in some instances, but these are rare exceptions to the general rule. The opium-taker is in a passive state, satisfied with his own dreamy condition while under the influence of the drug. He is useless, but not mischievous. It is quite otherwise with alcoholic liquors. When Bishop and his partner murdered the Italian boy, in order that they might sell his body, it appeared in evidence that they prepared themselves for the task by a plentiful libation of gin. The same course is pursued by housebreakers, and others who engage in desperate criminal undertakings. It is worthy of notice, also, that opium is physically much less deleterious to the individual than gin or brandy. Many opium-takers live to a great age, while dram-drinking induces disease of the liver, with its attendant bodily suffering, ill-temper, wretchedness, and premature death.

The effect of malt-liquor, like that of gin, depends on the alcohol which it contains, modified, however, in some degree by the sedative properties of the hop. But it is much less dangerous. According to Mr. Brande's tables, the proportion of alcohol in gin is as much as 50 per cent., while in London porter it is not much more than 4 per cent. The porter-drinker, therefore, must drink 6¼ pints of porter to obtain gradually the effect which the gin-drinker obtains at once from half a pint (8 ounces) of gin. Gin-drinking, moreover, is in some other respects better suited to the ill-disposed part of the population. It does not distend the stomach as is the case with the more diluted liquor when taken in large quantity; and therefore does not at the time interfere so much with active exertion. It is also more economical, eight ounces of the strongest gin (at the present price) costing about one sixth part less than their equivalent in porter.

Tobacco, as it is commonly used, is certainly less mischievous both as to the individual, and as to society at large, than alcohol. At the same time (independently of the unwholesome influence which it has on the digestive organs) there is sufficient evidence that an excessive indulgence in the use of it produces ultimately a very ill effect on the nervous system. A distinction, however, must be made between smoking tobacco and the employment of it in other ways. It has been shown that by the application of heat above the temperature of boiling water, a new compound (the empyreumatic oil) is generated, which is not only a very much more active poison, but one which operates especially on the brain in a manner entirely different from the unprepared tobacco.*

NOTE D. Page 171.

ALTHOUGH Dr. Mayo's 'Croonian Lectures on Medical Testimony and Evidence in Cases of Lunacy' have been on one point referred to in the text, they were not published until a considerable time after these papers were ready for the press.

Dr. Mayo has carefully analysed the facts which bear on the question as to what has been called 'moral insanity.' He has shown that many of the cases described as belonging to this category were neither more nor less than examples of insanity, according to the strict and ordinary interpretation of that term. He has shown that others, in which the plea of 'moral insanity' was set up as an excuse for crime, deserved no better appellation than that of 'brutal recklessness;' and that to acquit criminals of this class on the ground of irresponsibility, is only to induce others to follow in the same course, who might otherwise be restrained by a wholesome fear of punishment.

Even with regard to those who are actually insane, he is of opinion that there is a defect 'in the nature of our criminal code, which recognises no punishment for offences committed by the insane; and forces the Courts either to visit them with the same penal inflictions as would apply to the same acts committed by the sane, their derangements being ignored, or to let them pass unpunished, however partially responsible they may appear.'

Dr. Mayo has treated the whole subject, including that of mere unsoundness of mind, in the most able and lucid manner; and his observations on it are the more valuable, and will have the greater weight, as they come from one who combines just theoretical views with the practical knowledge of an experienced physician.

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* See 'Experiments and Observations on the different Modes in which Death is produced by certain Vegetable Poisons,' by B. C. Brodie, F.R.S., Phil. Transactions, 1811.

Note E. Page 183.

Even setting aside the cases of dying persons, or of those who labour under serious disease, there is sufficient evidence that in many instances those who appear to be insensible to external impressions are not so in reality; the apparent insensibility being the result of a strong dislike, or disinclination, to make the effort necessary for giving expression to what they feel, and of nothing more.

Esquirol describes the case of a young man who, after some disappointment in life, fell into what seemed to be a state of idiotcy. His eyes were fixed: his physiognomy was without expression. It was necessary to dress and undress him, and to put him in bed. He never ate, except when food was put into his mouth. He never walked, except when compelled to do so. He recovered after the use of some remedies, and the appearance of an eruption on his skin. After his recovery he confessed that he had never been insensible at all, but that an internal voice was always repeating to him, '*Ne bouge pas! ne bouge pas!*' and that fear alone had rendered him immovable.*

In other instances, the apparent insensibility is the result of mere imposture.

A young woman (a hospital patient) under the care of Esquirol, seemed to be in a state of profound stupor. She lay motionless in her bed, never speaking, even when pinched or pricked with a sharp instrument. A seton was made in her neck, and blisters were applied in various parts of her body, but she gave no signs of feeling, or even of knowing what was done. One day, however, when Esquirol paid her his usual visit, she had left her bed of her own accord, and from that time nothing could persuade her to remain in the dormitory at the time when he was expected.

When she left the hospital she confessed that her insensibility had been feigned. She said that one of the students had made the experiment of pinching her; that she had felt no objection to this being done by Esquirol himself, but that she did not choose to submit to what she conceived to be a piece of impertinence on the part of the student, and therefore had determined to be always out of the way when the medical attendants were to visit her.†

A case recorded in the Philosophical Transactions very forcibly illustrates the extent to which such an imposture may be carried.

A young man, the son of a farmer in the neighbourhood of Bath, fell into what was supposed to be a state of profound sleep, which lasted during seventeen weeks. During this time he was visited by a great number of persons, and various attempts were made to awaken him, but without success. He was cupped; spirit of ammonia was held to his nostrils, and even poured into them so as to occasion inflammation and blisters, but all in vain. He slept on as before, and hence Dr. Oliver, who relates the case, was satisfied that 'he was really asleep, and no sullen counterfeit, as some persons thought him.'

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* Esquirol, op. cit. vol. ii. p. 287.

† Esquirol, op. cit. vol. ii.

The correctness of Dr. Oliver's opinion may, however, well be questioned: as every night his mother placed on a stool by his bed some bread and cheese and beer, which always had disappeared in the morning; and as certain functions, the necessary consequence of eating and drinking, were regularly and decently performed.*

Impostures of this kind will appear in no degree extraordinary to those who are accustomed to witness surgical operations, not performed under the influence of anæsthetic agents, and who know how common it is for patients to undergo even those of the most painful kind without uttering a complaint, or in any way expressing what they feel.

NOTE F. Page 208.

THERE probably is in the whole range of science no problem the solution of which is more difficult than that of the relation of the mental faculties to particular parts of the nervous system. Some very general propositions may be considered as established on not very insufficient data, and it is not impossible that by the method pointed out in page 177—namely, a careful study of the habits and faculties of inferior animals, pursued simultaneously with the examination of the differences of structure of the brain—some further insight may ultimately be obtained into this mysterious subject. It is not easy to understand in what other way this object can be obtained. The inquiry, however, is one which may well excite our curiosity, and it is no matter of wonder that it should have attracted the attention of physiologists. Those who wish to be more particularly acquainted with the views entertained by the most eminent modern physiologists may refer to Dr. Carpenter's 'Principles of Human Physiology.' Allusion has been made in a former part of this volume to the crude speculations of Dr. Hooke. The subject has been treated of in a more elaborate manner by a contemporary of Hooke, being the most distinguished anatomist and physiologist of the seventeenth century; and the following abridged account of the conclusions at which he had arrived is offered to the reader, as it may be interesting to compare them with the opinions which are held at the present day. It is plain that the majority of these conclusions do not rest on any very sure foundation; but '*valeant quantum valent.*'

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* Philosophical Transactions, 1706, vol. xxiv.

According to Willis,* the nervous force (termed by him the animal spirits) is generated wholly in the grey or vesicular substance of the brain, which, being a kind of secreting organ, is therefore possessed of a higher degree of vascularity than the medullary. The convolutions of the cerebrum and the folds of the cerebellum are intended to offer a more extended surface for the grey substance, and thus to enable it to furnish a more abundant supply of the nervous force than could have been furnished otherwise. The medullary substance (in which Willis had detected the existence of a fibrous structure, having traced the fibres from the *medulla oblongata*, through the *corpora striata* and *thalami*) is intended for the transmission, exercise, and dispensing of the nervous force, but not for its production.

By means of the medullary substance, connected as it is with the grey substance of the convolutions, the nervous force is transmitted to the *corpus callosum*, and this last-mentioned organ is that which is principally connected with the intellectual faculties; at the same time that, by combining the two hemispheres of the cerebrum, it enables them to cooperate with each other. The forms of sensible objects are preserved in the convolutions, '*tanquam in diversis cellulis et apothecis*;' from which we must conclude that Willis regarded these as especially connected with the memory. The *corpora striata* are the channel of communication between the *medulla oblongata*, the nerves, and the cerebral hemispheres. They are themselves the seat of simple sensation. But the impressions of the senses being transmitted from thence to the *corpus callosum*, and from the latter to the convolutions, become there subservient to the memory and imagination, and excite in the mind the feeling of desire, and acts of volition. The same impressions, in some instances, instead of being transmitted to the cerebrum, are, by a reflex operation, propagated in the other direction—that is, to the nerves, producing in them effects of which the mind takes no cognisance, and motions of which we are therefore unconscious.

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* See his treatises *De Anatome Cerebri* and *De Animâ Brutorum*; the latter, however, is chiefly occupied with metaphysical speculations, many of which relate to matters which may well be regarded as beyond the limits of human knowledge.

The cerebellum belongs more especially to what Bichat has called 'organic life,' and furnishes the nervous force required for the action of the heart, respiration, digestion, and the other mere corporeal functions. It is also the part principally connected with the animal instincts (*instinctus mere naturales*), and the emotions; but not exclusively so, as the other bodies, situated in the base of the brain, belong to the instincts and emotions also. With regard to the instincts, Willis supposes the cerebellum to be associated with the cerebrum, inasmuch as the desires belonging to them can produce no effect until their influence is communicated to it, exciting in the mind, through its intervention, the act of volition. As regards the emotions also, the cerebellum is associated with the cerebrum, but in this case, the movement is in the opposite direction, beginning in the cerebrum, and from thence extending to the cerebellum, so as to affect the heart, and other organs which are under its immediate control.

NOTE G. Page 209.

THE following case may be adduced in confirmation of the evidence which anatomy affords as to the grey matter of the nervous system being the part in which the nervous force is generated:—A young woman, of hysterical constitution, died after having been for some days in a state of great mental excitement, attended with convulsive movements of the limbs, resembling those of aggravated chorea, consequent on her having been terrified by a man who had insulted her in a most outrageous manner. On examination of the parts after death, the determination of blood to the grey matter on the surface of the convolutions was found to have been such as to make it everywhere of a scarlet colour.

The circumstance of the convolutions of the cerebrum being more numerous and complicated, thus presenting a larger surface for the expansion of the grey matter in man than in any other animal, seems to justify the opinion enunciated by Des Moulins, and adopted by Dr. Carpenter, Dr. Todd, Mr. Bowman, and other eminent physiologists, that this peculiar structure is connected with the greater extent of the intellectual faculties in the human race. The observations of Leuret, however, founded on a comparison of the brain in a large number of animals, tend to create some doubt as to the accuracy of this conclusion.* For example, the convolutions of the brain in the sheep are numerous and well marked, while in the brain of the beaver and of the rat there are almost none at all. But who can doubt that the intelligence of the two last-mentioned animals is much greater than that of the former? Frederic Cuvier, indeed, finding that the beaver, living without companions, in the *Jardin des Plantes*, when supplied with wood, began to build a hut in the same way as when living in association, was led to believe that he was of a very low degree of intelligence, and almost wholly under the dominion of instinct.* But, on the other hand, it is affirmed by Buffon that a solitary beaver, in a well-inhabited country, does not build a hut at all, but seeks for his residence some natural excavation on the bank of a river;† and Cartwright, describing the habits of beavers, as observed by him in Labrador, adduces various instances of their adapting their proceedings to the new and peculiar circumstances in which they are placed in a way which can be attributed only to intelligence.

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* Anatomie comparée du Système Nerveux, chap. 6me.

Monsieur Dareste suggests that the extent of the convolutions bears a relation, not to the intelligence, but to the size of the animal,‡ a view of the subject corresponding to that taken by Haller,§ and supported by many facts. But here also there are exceptions sufficient to prevent the adoption of the general rule. For instance, the kangaroo is a much larger animal than an average dog, but the convolutions of the brain in the former of these animals are very much less extensive than they are in the latter.

NOTE H. Page 217.

IT is but just to the accomplished and learned author of the 'Philosophy of Language,' that the entire passage, from which an extract has been given in the text, should be presented to the reader.

'Speech, the language of articulate sounds, is the most wonderful, the most delightful, of the arts which adorn and elevate our being. It is also the most perfect. It enables us, as it were, to express things beyond the reach of expression; the infinite range of existence; the exquisite fineness of emotion; the intricate subtleties of thought. Of such effect are these shadows of the soul; these living sounds which we call words! Compared with them how poor are all other monuments of human power, or perseverance, or skill, or genius! They render the mere clown an artist; nations immortal; orators, poets, philosophers divine!'

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* Annales d'Histoire Naturelle, tome ix. pp. 291-318.

† Ibid. tome i. p. 266.

‡ Comptes rendus, Janvier, 1852; Annales d'Histoire Naturelle, 3me série, tome xviii.

§ Elementa Physiologiæ, lib. l. n. 7.

In the work here referred to, a just and very important distinction is made between mere language and articulate language, or speech; the former being used as a generic term, applicable to all the different methods by which animals communicate their wants and feelings to each other; speech being used as a specific term, representing that kind of language which consists of the voice produced by the larynx, and then modified by articulation, that is, by the action of the muscles of the throat and mouth.

According to this definition, we cannot suppose any race of animals, with the exception of some of those of the very lowest orders (the oyster for example), to be absolutely and entirely without the use of language. That the gregarious birds possess it to a very considerable extent must be plain to any one who has watched rooks in their rookery, or observed swallows collecting gradually on a parapet wall, and chattering with each other before they take their flight all at once for their winter habitations.

At the same time it would seem that the language of birds, and the gregarious mammalia, is limited to varieties of voice in the larynx; and that on man alone has been conferred the inestimable boon of articulate language or speech. Such slight modifications of the voice in the passages of the mouth and nostrils, as occur in the barking of a dog, or the bleating of a sheep, or the unmeaning imitation of certain words by parrots and starlings, cannot properly be regarded as exceptions to this general rule. The different sounds, and combinations of sounds, which may be produced in the larynx, numerous as they may be, would be quite insufficient for the complicated relations of human society, and quite inadequate to express the sentiments, and desires, and thoughts of the individuals of whom it is composed. Speech, with all its endless varieties of sound and intonation, and accent, could alone meet these requirements. If a higher order of intellect be necessary for speech, the latter is not less necessary for the full development of the intellect. Without it, human society might have been little better than that of rooks or beavers; with it, it is impossible to say how much further progress may not yet be made in knowledge and civilisation; or, in after ages, what still higher destiny may be reserved for man, even here on earth.

As there is no instance of any, even the smallest and most degraded, community of human beings, who are without it, so we cannot do otherwise than regard the faculty of speech as having its origin in instinct. This, however, like the other instincts which appertain to man's social condition, differs materially from those which appertain merely to the individual. The latter class of instincts are simple, and in themselves complete. The former are as nothing until they have been called forth by intercourse with others, and even then are of little avail without the help of education and experience. The savage of Aveyron, who had been living wild in the woods until he was approaching the age of puberty, expressed what he felt only by inarticulate cries, and had no more notion of articulate sounds than he had of moral relations. There are many other, and apparently well-authenticated, histories of deserted children, living wild in solitude, or associating with animals; and it is worthy of notice, that they were not only incapable of uttering articulate sounds when first they were discovered, but that, with one or two exceptions, it does not appear that any of them ever learned to speak afterwards.* It would seem that it is only at a very early age that the ear can be taught to make that nice distinction of sounds, and the muscles of the mouth and lips be trained to those nice varieties of action, which are alike necessary to speech; an observation which is confirmed by our every-day experience of the difficulty of acquiring the right pronunciation of any foreign language with which we have not been familiar from a very early period of life. The difficulty is sufficiently great as to languages the most nearly allied to our own, but it must be immeasurably greater as to others differing more widely from it, being spoken by other families of the human race, of other habits, in other climates, and in other regions of the earth. The various modes of spelling the name of the founder of the Mahometan religion adopted by English writers show how different has been the impression which these simple Arabic sounds have made on different English ears; and we are told that 'travellers collecting the dialects of tribes in the Caucasus, and on the frontiers of India, have brought home and published lists of words gathered on the spot, and from the same people, and yet so different in their alphabetical appearances that the same dialect has figured in Ethnological books under different names.'† A consultation of philologists has lately been held, having for its object to invent an universal alphabet applicable to all existing languages, with a view especially to facilitate the labours of the missionaries. That something may be done in this direction is probable enough; but the most comprehensive alphabet that human ingenuity can contrive will not meet the main difficulty of the case; and, taking into consideration all the circumstances which have been mentioned, it does not seem reasonable to expect that the proposed object can be attained, except to a very limited extent.

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* A work entitled 'Notice historique sur le Sauvage de l'Aveyron, par P. J. Bonnaterre, Professeur de l'Histoire Naturelle &c.,' contains much curious information respecting not only the Savage of Aveyron, but also respecting many other cases of children similarly deserted.

† Proposal for a Missionary Alphabet, by Max Müller, M.A., Taylorian Professor of Modern Languages at Oxford, page 45.

Note I. Page 235.

If any one of the phrenological doctrines has been supposed to be better established than another, it is that of the cerebellum being the seat of the sexual passion. The following extract from Leuret's work on the Nervous System will show what it is really worth :—

'Le développement comparatif de l'encéphale des chevaux soumis à la castration, et de ceux que l'on a laissés entiers, devait, s'il était bien déterminé, servir à la solution des questions que je m'étais posées, et me fournir un document propre à confirmer ou à détruire la théorie de Gall concernant l'influence que la castration exerce sur le cervelet. M. Gérard Marchant a bien voulu faire pour moi cette épreuve, en pesant comparativement le cerveau, le cervelet, et la moëlle allongée d'un certain nombre de chevaux entiers, de juments, et de chevaux hongres, qui servent aux opérations de l'école d'Alfort. Les pesées faites par M. Marchant, avec le concours de M. Lassaigne, offrent toute la garantie d'exactitude que l'on peut désirer, et je les regarde comme infiniment préférables à la simple inspection du crâne dont Gall se contentait toujours, ou même à la mensuration de la cavité crânienne du cervelet, quelque exacte qu'on puisse la faire.

'Le tableau suivant contient le poids absolu et le poids relatif du cerveau, du cervelet, et de la moëlle allongée de quarante-trois chevaux entiers, douze juments, et vingt-un chevaux hongres.'

Here follow the tables, which it is unnecessary to give in detail, but of which the following is the result :—

'La comparaison du poids relatif du cerveau et du cervelet donne ce rapport d'une manière exacte ; et ces rapports sont les suivants :

'Chez les chevaux hongres le cervelet est au cerveau comme 1 est à 5·97
Chez les juments . . . . comme 1 est à 6·59
Chez les étalons . . . . comme 1 est à 7·07

'Ainsi ce sont les étalons qui ont comparativement le cervelet le moins développé : les juments sont mieux favorisées qu'eux sous ce rapport ; et les chevaux hongres le sont plus que les uns et les autres. Si l'une des deux parties principales de l'encéphale s'est atrophiée, c'est le cerveau, car il est seulement de 419 grammes, tandis que le cerveau des étalons est de 433 ; et si l'une d'elles s'est développée de manière à prédominer sur les autres, c'est le cervelet des chevaux hongres, qui pèse 70 grammes, tandis que celui des étalons et des juments n'ont pesé que 61.'*

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* Anatomie comparée du Système Nerveux, tome i.

Whoever is desirous of inquiring further into the system of Gall and Spurzheim, will do well to consult the 'Examin de la Phrénologie,' by M. Flourens, and the 'Treatise on Phrenology,' in the seventh edition of the Encyclopædia Britannica, by Dr. Roget. In the former the subject is discussed on general grounds; in the latter it is still more fully considered in its details; and in both it is treated in a manner worthy of the high reputation of the respective authors.

PSYCHOLOGICAL INQUIRIES.

THE SECOND PART.

BEING A SERIES OF ESSAYS INTENDED TO ILLUSTRATE SOME POINTS IN THE

PHYSICAL AND MORAL HISTORY OF MAN.

In offering a Second Part of 'Psychological Inquiries' to the notice of the public, I have no expectation that it will be found to include any record of facts which were not already known to many of my readers; nor do I doubt that those who have been in the habit of reflecting on these subjects have arrived at conclusions very similar to those at which I have arrived myself.

I have on the present occasion, as I had formerly, two objects especially in view, one of these being to show that the solution of the complicated problem relating to the condition, character, and capabilities of man is not to be attained by a reference to only one department of knowledge; that for this purpose the observations of the physiologist must be combined with those of the moral philosopher, mutually helping and correcting each other, and that either of these alone would be insufficient.

The other object to which I have alluded is, that I would claim for researches of this kind that they should be regarded not as merely curious speculations, but as being more or less of practical importance to every individual among us, enabling us to understand to how great an extent we may contribute to the improvement of the faculties with which we are endowed, and to our own well-being in life.

If I have preserved the mode of dialogue, it is not merely because it is in conformity with the plan of the former volume, but also because it seems to be well adapted to a subject the knowledge of which is not sufficiently complete nor sufficiently well-defined to admit of it being presented in the same systematic form as that which is the foundation of some other sciences.

PSYCHOLOGICAL INQUIRIES.

THE SECOND PART.

THE FIRST DIALOGUE.

Introduction—Rural Occupations—Natural History—Advantages to be derived from the Study of the Physical Sciences—No absolute Connection between Wisdom and Knowledge—Views of the Turkish Cadi as to the Value of the former—The other Side of the Question—Advantageous Cooperation of the Desire of Reputation with the Love of Knowledge—Importance of Knowledge as furnishing Materials for the Imagination—The Diffusion of Knowledge the principal Agent in the Extension of Civilisation—Importance of the Science of Mind, as distinguished from Abstract Metaphysics—Comparison of the Advantage to be derived from the Study of the Physical with that of Mental Science—The latter to be distinguished from the Discussion of Metaphysical Subtleties—Human Inquiries limited not only by the Want of Experience, but by the Imperfection of the Human Faculties—Vain Attempts of Human Curiosity to penetrate beyond these Limits—Hypotheses may be useful, if taken for no more than they are worth—Questions beyond the Reach of the Human Intellect—Superiority of the Modern Method of pursuing Scientific Investigations, as compared with that of Ancient Times—The Love of Knowledge the only sure Foundation for Scientific Research—Danger to the Progress of Knowledge from the too great Intervention of the Utilitarian Principle.

Another year had passed over our heads. Crites and I, though fully occupied with the duties of our respective professions, had still found some intervals of leisure, in which our minds reverted to our conversations with Eubulus; and I believe that I may say for him, as well as for myself, that we felt that the few days which we had passed in our friend's retreat had not been, on the whole, unprofitably employed. In our daily pursuits we found much that served to illustrate our former speculations, thus giving to our practical dealings with mankind an additional and a higher interest, by connecting them with the great science of human nature. An invitation from our friend to repeat our visit was very acceptable to us, and we again willingly availed ourselves of the opportunity of exchanging for a time the '*fumum et opes strepitumque Romæ*' for the fresh air and quiet of his residence in the country.

We found Eubulus as we had left him, spending some hours in the day among his books and papers, and at other times attending to the not unimportant duties which he had created for himself among his tenants and labourers; especially endeavouring to improve the condition of the latter, not so much by dispensing charity among them (though in this he was not deficient) as by the judicious exercise of his influence, with a view to promote those habits of prudence and forethought and attention to domestic economy, the want of which in that class of society is one principal cause of the inconveniences to which they are subject.

The ornamental grounds adjoining his mansion were not very extensive, but they were laid out with considerable taste, and contained many rare and interesting specimens of the vegetable creation, collected from various regions of the earth. A splendid aloe, which, after a repose of many years, was again loaded with flowers, presented a striking contrast to the dark coniferous trees, which by a skilful cultivation were made to flourish as if they had been still in their native climates; while elsewhere a choice collection of orchidaceous plants and other exotics, under the influence of artificial heat, offered themselves as objects of interest not less to the unlearned visitor than to the scientific botanist. Eubulus did not pretend to have paid any unusual degree of attention to the subject; nevertheless he had studied it sufficiently to be able to afford us much curious information as to the economy of plants and vegetable physiology which we had not previously possessed. 'Having,' he said, 'had my mind always a good deal occupied in other ways, I cannot pretend to have dived very deeply into these matters. Nevertheless, even the little knowledge of natural history which I have been able to obtain has been to me a source of much enjoyment since I entered on my present mode of life. In my daily excursions I am not only gratified by the beauty of the landscape, constantly varied as it is in a hilly country, by the alternations of light and shade, of gloom and sunshine, and in another way by the harmony of rural sounds, so different from the discords of London streets, but I find an additional source of interest in watching the development of buds and flowers, the growth of trees, the progress of plantations, the habits of birds and insects, and all that activity of animal life by which we are surrounded. I should indeed be sorry if the time were ever to arrive when the study of these things was to supersede those other studies which form, as it were, the staple of what is now considered to be the higher kind of education. I can conceive no better method of training the intellectual powers in early life than the acquiring a knowledge of the ancient languages of Greece and Italy; nor any better method of improving the taste, or furnishing the mind with graceful recollections and ennobling sentiments, than an acquaintance with the great writers of antiquity. But I do not see why these should be the exclusive studies of our schools, nor can I doubt that much good would arise from conjoining with them those other studies which relate to the phenomena of the universe. It is not to be supposed, nor is it reasonable to expect, that everyone should be a profound astronomer or chemist or naturalist; but some general knowledge of these sciences cannot fail to be useful to us all individually, besides making us more useful members of society as we advance in life.'

Crites. Admitting the force of all that you have said, yet there are circumstances which might lead me to entertain the opinions which you have expressed less confidently than I should have done otherwise. After all, how very little can the greatest amount of human knowledge on these subjects really be! To us the universe presents itself as an assemblage of heterogeneous phenomena, some of which we can reduce to laws of limited operation, while others stand by themselves, bearing no evident relation to anything besides. We may well suppose that there are in the universe Beings of a superior intelligence, and possessed of a greater range of observation, who, if I may be allowed to use such an expression, are sufficiently behind the scenes to be able to contemplate all the immense variety of material phenomena as the result of one great general law impressed on all matter, and to which the whole universe is subjected. But, with our limited capacities, we are compelled to take humbler views, and to grope our way as well as we can among the changes which are taking place around us, as if the mechanical, chemical, and vital laws by which they are governed, were wholly distinct from each other. Then it may be admitted as a question whether it is a matter of course that the extension of human knowledge really leads to an extension of human happiness. Further it may be remarked that the history of science as well as of literature shows that even those who are engaged in these loftier pursuits are not altogether exempt from the frailties of human nature. There is an avarice of reputation, as there is of money; and the competitors have not always been so liberal to each other as they might have been well expected to be. Is it not also really true that there is no connection between wisdom and knowledge; that there may be much of either one of them with very little of the other; and that those who have the smallest amount of knowledge are not unfrequently led by their instinct to reason more accurately than some very learned persons, even than those who have studied logic as a science? Taking all this into my consideration, I am sometimes led almost to sympathise with the sentiments expressed by the Turkish Cadi in his farewell letter to Mr. Layard: 'There is no wisdom equal to the belief in God. He created the world. Shall we liken ourselves unto Him, in seeking to penetrate into the mysteries of His creation? Shall we say, "Behold how that star spinneth round that other star?" Let it go. He from whose hand it came will govern and direct it . . . If thou wilt be happy, say "There is no God but God." Do no evil, and then thou wilt fear neither man or death; for surely thine hour will come.'

EUBULUS. It is true that the most profound knowledge which man has been able to obtain must be very limited, compared with that which we may suppose to be within the reach of Beings of greater intelligence and power. Yet, considering the difficulties which stand in his way, and the imperfect means placed at his disposal, it is to me marvellous that so much should have been really accomplished. Could it have been supposed, *à priori*, that a being who under certain circumstances is presented to us as a rude savage, should under other circumstances have become Aristotle or Newton? With regard to your last observations, they amount to no more than this—which I am afraid that I must admit to be true—that neither knowledge nor philosophy is in all cases sufficient to counteract the effect of human frailty. I must also admit that it is not always a pure love of knowledge that stimulates the labours of the philosopher. However sincere that love may be, I will not say that it never happens, but it certainly rarely happens, that the attainment of reputation is not one object to which he looks as the reward of his labours. How can it be otherwise? The desire of reputation,

> 'The last infirmity of noble minds,'

is an essential part of human nature; an instinct implanted in us for a wise purpose, and, however it may be misdirected in some instances, productive on the whole of the greatest benefit to mankind. I fully agree with you in the opinion that there may be much of wisdom with little knowledge, and much knowledge with little wisdom; but surely you will not deny that, as a general rule, the effort to acquire knowledge tends to the improvement of the intellect, by bringing into action some of its higher faculties, which might have remained in abeyance otherwise. It may be that an increase of knowledge does not improve the judgment on the facts which are actually brought before us; but it produces an effect which is nearly equivalent, inasmuch as, by extending our observation to a greater number and variety of facts, it enables us to see further, to have broader views, and thus to arrive at more accurate conclusions. You seem to doubt whether the extension of knowledge adds to human happiness; but is it not true that the causes which tend to the shortening of human life are, with few exceptions, such as produce either bodily pain or moral suffering, and that the average period of life is longer in civilised than in uncivilised communities? Then see how the pursuit of knowledge must necessarily operate on those who devote themselves to it; how it elevates the mind to higher views than those which are entertained by the ignorant and the lazy; how it affords worthy objects of contemplation for leisure hours, and supersedes the inclination for low pleasures and mere sensual enjoyments. While other creatures seem to be wholly occupied with the objects which are actually before them, or impelled to the pursuit of those which are more distant by the force of instinct, man is essentially an imaginative animal. From the materials which his memory affords him, he creates, he abstracts, he makes new combinations: he strives to look into the mysteries of the past, and to lift up the veil which conceals the future. A large portion of life, even that of the dullest person, is spent in the exercise of the imagination. How much, then, must the character of each individual depend on the circumstance of this faculty being worthily directed! I do not say that there are not other studies which will answer the purpose as well, but it cannot be denied that none will answer it better than that of the physical phenomena of the universe around us. Here, more than anywhere else, we find displayed to us that order, and those unmistakable examples of design and of the adaptation of means to ends, by which we are compelled to recognise the agency of one vast superintending Intelligence, and which constitute the sure foundation of natural theology. Here, too, the field to be explored is of unlimited extent. As we advance, the horizon which seems to bound our view recedes further and further from us. Every fresh discovery is but the beginning of a further progress, so that the more we know, the more we find that we have yet to learn. In this department of knowledge another great advantage is offered to us, inasmuch as, in the different sections of it, the exercise of different faculties of the mind is required. In some we rely almost wholly on simple observation; in others, observation would accomplish little without the aid of experiment; and in others still, where the phenomena are of a simpler kind, and the laws by which they are regulated more exactly determined, the mathematician is enabled to apply his marvellous science, so as to ascertain facts beyond the limits of human experience, and predict changes in the universe which may not be completed before the race of man has ceased to exist on the earth. Thus every variety of the human intellect may find in these studies its suitable employment. The discursive imagination of one, the aptitude for arrangement and classification possessed by another, and the mathematical genius of a third individual, may alike be turned to a good account; and he, who might be held to be stupid if his attention were limited to one subject, may be enabled to show that he too has his peculiar talents by directing it to another.

Ergates. However he may have expressed himself, I do not suppose that Crites seriously intended to support the views of the Turkish Cadi, or that he has really any doubt as to the advantages which we may individually derive from the acquirement of knowledge, both as affording us an agreeable occupation, and as tending to improve the moral as well as the intellectual character. But it does more than this. Observe the effect which the general diffusion of knowledge produces on society at large; how it draws the different classes of it into more free communication with each other; how its tendency is to make the laws more impartial, bring even the most despotic governments under the influence of public opinion, and show them that they have no real security except in the good will of the people. Knowledge goes hand-in-hand with civilisation. It is necessary to the giving full effect to the precepts of the Christian faith. It was from the want of it that

Galileo was tortured by the Inquisition, that Servetus was burned by Calvin, that the Huguenots were persecuted and slaughtered by Louis XIV., and that in numerous other instances one sect of Christians has conceived it to be their duty to exterminate another. It is a misapplication of the term civilisation to apply to it to any form of society in which ignorance is the rule and knowledge the exception. If a Being of superior intelligence were to look down from some higher sphere on our doings here on the earth, is it to be supposed that he would regard the Duke of Buckingham, dancing at the French Court, and scattering the pearls with which his dress was ornamented on the floor, as being really superior to an Australian savage; or that he would see in the foreign Prince who at a later period exhibited himself at another Court with his boots glittering with diamonds, any better emblem of civilisation than in the negro chief, who gratifies his vanity by strutting about in the cast-off uniform of a general officer?

But, reverting to the observations which you have just made, you must excuse me for saying that, although you disclaim the intention to do so, you have given a more prominent place to the physical sciences, as objects of inquiry, than really belongs to them. I do not mean to express a doubt as to their great importance, or as to their answering all the purposes which you attribute to them; but it may be a question whether in these times they do not too exclusively occupy our attention, other inquiries which are not less important being comparatively neglected. I refer more especially to those which relate to the operations of the intellect, the laws of our moral sentiments—in short, all that belongs to the one individual percipient and thinking Being, which each of us feels himself to be. These subjects, which may all be conveniently included under the name of Psychology, constitute a science quite as real as astronomy, chemistry, or natural history; inferior to none of the physical sciences in interest, and I may add in usefulness. I know of no better exercise than that which these inquiries afford for the mind itself, especially as they tend to improve in us the habit of thought and reflection, as they enable us to form a just estimate of our own powers and of the nature and limits of human knowledge; thus rendering us more competent to pursue other inquiries, however different in their nature, with advantage. Observe that I suppose the study of mental phenomena to be properly conducted, and limited to its proper objects, without being adulterated by those wild speculations in which some have indulged, and which have given the science rather a bad reputation under the name of metaphysics.

Eubulus. It has always happened that at one period the minds of those who observe and think have been more or less exclusively directed to one particular department of knowledge. This is as it should be; for thus by the united efforts of the many a greater progress is made in a particular science or class of sciences than would have been made otherwise. With the ancient Greeks the study of geometry and of moral philosophy in its various branches predominated, and to such an extent that little progress was made by them in the physical sciences. At the present time the latter have taken the place of more abstract speculations, and we see the result in the marvellous progress which has of late been made in unravelling the mysteries of the external world. Another result, however, is that many, and perhaps the majority among us, are too much disposed to look upon the material universe as if it were all in all, and to ignore or disregard those other inquiries to which you have alluded. I, for one, do not underrate their importance, nor in any way differ from the opinion which you have expressed as to their usefulness. I believe that whoever would form a right estimate of himself and others; whoever would improve his own character; whoever aspires to the high office of ameliorating the condition of society, whether as a statesman, as a religious teacher, as the promoter of education, or in any humbler capacity, can in no other way so well qualify himself for his undertaking, whatever it may be, as by studying the laws which regulate his own mind, displayed as it is in his own perceptions, sentiments, thoughts and volitions. This is the only true foundation of that great science which, for all practical purposes, is more important than anything besides—the science of Human Nature.

Still I cannot persuade myself that if the study of psychology, or, if you please, the moral sciences, were to prevail to the same extent as that of the physical sciences prevails at present, it would lead to any proportionate result. The latter offer to us a domain which is the same as if it were of infinite extent. Every addition to our knowledge leads to knowledge further still; and if that exercise of the imagination, which constitutes the genius of the scientific discoverer as much as it does that of the poet, be regulated by the true spirit of the Inductive philosophy, even where the hypothesis which has led us on is proved to be erroneous, a substance and reality remains, which shows that it has not been employed in vain. But it is quite different as to those studies which have for their object the phenomena and operations of the mind. Here we depend wholly, or almost wholly, on the means afforded by simple observation. The field which is open to us is of limited extent; and ere long we discover that, whatever our powers of observation may be, we can advance no further. If we look into our own minds, up to a certain point there is as much reality as there can be in any other department of human knowledge. So we may learn a good deal as to the varieties of mind as it exists in other men, and even in the inferior animals, and may obtain some, however dim, glimpses of that great creative Intelligence which we see displayed in the order and design of the world in which we live. But we soon arrive where our knowledge ends, and, if we endeavour to overleap this boundary, we pass at once into a region of mists and shadows, where the greatest Intellects do but grope their way to no good purpose, striving to know the unknowable, and speculating on subjects beyond their reach.

Ergates. If mental science, under the name of metaphysics, has, as I just now remarked, acquired but an indifferent reputation, it is not because the working of the mind is not as fit a subject of observation as the phenomena of the material world, but because metaphysicians have been too apt to mix up with these inquiries the discussion of others which are beyond our capacities. What is the origin of those simple beliefs on which all our knowledge rests?—of that of the existence of the external world?—of something beyond ourselves?—of our own identity?—of the relations of cause and effect?—of the axioms of mathematics? Are these convictions, and various others which might be enumerated, forced upon us by the constitution of our own minds, or are they all resolvable into our experience? and, if so, wherefore do we believe in our experience? Philosophers have not been wanting in their attempts to answer these questions; but they have answered them in different ways, and their speculations have led to no useful or practical result. The convictions remain the same in all of us, complete and unalterable, explain them as we may. But such discussions, however tempting they may be to human curiosity, form no necessary part of the science of psychology, and only tend to injure its character and usefulness.

The fact is, that we are bound and hemmed in not only by the want of opportunities of experience, but also by the limited nature of our faculties; and that, in this last respect, the difference between one and another department of knowledge is only in degree. One great advantage of that study of our own minds, which constitutes the foundation of psychology, is that, if properly conducted, it leads us more than anything besides to be humble in our aspirations, and not to arrogate to ourselves powers and capabilities which we do not possess. In natural philosophy, or in physiology, many questions arise which are just as incapable of solution as any of those discussed by metaphysicians. I need not advert to the speculations of Plato in the Timæus, nor to those attributed to Timæus the Locrian in the treatise on the Soul of the world, nor to the dreams of Lucretius. The Vortices of Des Cartes, the Phlogiston of Stahl, nay, even the speculations of Newton himself respecting an all-pervading ether, are all examples of human curiosity striving to pass the bounds of human knowledge.

An hypothesis which has been once admitted, and to which men's minds have become habituated, will still continue to be taken for granted, long after the slender foundation on which it originally rested has melted away from under it. The notion of an imponderable material agent, as explaining the phenomena of heat —under the name of caloric—was a mere assumption, the more remarkable as it originated with philosophers who dealt less in hypothesis and more in matter of fact than any of their predecessors in the same department of science; yet it continued to prevail long after Sir Humphry Davy, in his Elements of Chemical Philosophy, had demonstrated its fallacy. The argument of Boscovick, showing that we have no grounds for the belief in the existence of solid impenetrable molecules of matter, is unanswerable; yet that other hypothesis which he substituted for it, of mathematical points (that is, points having no dimensions, surrounded by spheres of repulsion and attraction), is even more difficult to realise than that which it was intended to displace. The truth is, that when we attempt to enter on inquiries such as these, we find that we have arrived at the end of human knowledge, and that our speculations on such subjects as the ultimate molecules of matter, or the magnetic and electric fluids, are merely methods of bringing things which are beyond our comprehension down to the level of our capacities. They are like the x and y in algebra—with this difference, however, that in the one case, in working out the equation, we obtain the value of the unknown quantity, whereas we can arrive at no result analogous to this in the other.

Eubulus. Yet such hypotheses answer a useful purpose. They enable us, as it were, to bridge over the space which separates the known from the unknown, and to carry our researches into other regions of facts and realities which would have been otherwise inaccessible. But their usefulness fails if we take them for more than they are worth, and forget that they do not themselves constitute knowledge, although they may be employed as instruments to help us in obtaining it. I need scarcely add that there is nothing more essential to the success of scientific inquiry than that we should not waste our time, nor divert our attention from other objects, by speculating on things of which we neither have, nor can have, any actual experience.

Ergates. The observations which I made were intended to go further than this. It seems to me that, independently of the question of our having or not having opportunities of experience, there are on every side of us things which the structure of our minds does not enable us to comprehend. Do you believe that, under any circumstances, we should be able to understand why it is that a stone gravitates to the earth, or the earth to the sun; or that the sun itself is influenced by the other heavenly bodies, situated at what is to us an inconceivable, though not an immeasurable, distance from it; or that we should ever advance beyond the simple fact that it is so? The same observation may be applied to magnetic attraction and repulsion, and all other analogous agencies. Take another example. All the knowledge and reasoning which we can apply to the subject would lead us to believe that as there are no limits to space, so there are none to the material universe. Yet, if we would represent such Infinity to ourselves; if we try to conceive that, having the requisite power of locomotion, we might pass through worlds and suns, or matter in other shapes, for ever and ever, without arriving at an end, we find that even the imagination fails, and that we are lost in endeavouring to realise an idea which is beyond the reach of our capacities. Again, we recognise certain necessary truths, as, for example, that the square of the base of a right-angled triangle is equal to the squares of the two other sides. This is plain enough. But if we ask why does the Deity exist? why does anything exist? it is evident that it must be from necessity, and because it could not have been otherwise. But we can go no further. The nature of this other kind of necessity is absolutely and entirely beyond all human comprehension. Thus, as we are restrained in one direction by the want of opportunities of experience, so we are in another by the imperfection of our own faculties; and the first thing necessary for the right acquisition of knowledge is, that we should duly recognise the limits which are thus set to our inquiries, and not be led away from that which is real and substantial by the pursuit of the shadowy and fantastic. Referring to the past history of science, it cannot but occur to us how much greater progress would have been made in all its departments, if the cultivators of it had seen their way more distinctly in this respect.

EUBULUS. It is true that what you have now mentioned is among the principal causes which have retarded the progress of science in former times. But you must admit that not only at the present day, but for the last two or three hundred years, these investigations have been on the whole very differently conducted. The objects which are attainable have been better distinguished from those which are not; it has been well understood that in science, as in everything else, we have really nothing to do except with matters of fact, and with that classification of phenomena from which we deduce what are called the laws of Nature. No one now doubts that an exact knowledge of facts is the only basis on which the structure of science can be erected. The astronomer measures the heavens with as much care as a surveyor measures the divisions of an estate. The chemist weighs the results of his experiments with a balance which is affected by the thousandth part of a grain. The geologist, instead of pouncing at once on a Neptunian or Plutonian hypothesis, investigates the structure of different parts of the earth's crust; studies the character and position of the strata, and examines the fossil remains imbedded in them; and reviews the whole of the facts which he has thus collected, before he ventures to draw any conclusions from them.

ERGATES. You may add that even in the more complicated sciences of animal physiology and pathology, the importance of exactness as to facts, however difficult the attainment of it may be, is not less fully appreciated than in those which you have enumerated; and if you were to make yourself acquainted with what goes on in a modern hospital with a well-conducted medical school attached to it, you would find that the mode in which investigation as to disease and the operation of remedies is carried on, is perfectly in accordance with the rules which Lord Bacon has laid down for the improvement of medical science in his treatise on the Advancement of Learning. My apology for interrupting you with this remark is, that I have met with not a few of the uneducated part of what are called the educated classes, who seem to think that medical science, especially in that department of it which relates to internal diseases, is little better than a kind of guess-work, in which if correct opinions are formed, it is rather by accident than by any strict process of observation and reasoning.

Eubulus. I am glad to receive such a confirmation of the views which I have endeavoured to express. If there be any danger to science in the future, it will be not from any want of precision and caution in the conduct of scientific inquiries, but quite of another kind. To love knowledge for its own sake, to find in the advancement of knowledge 'its own exceeding great reward,' to be impressed with the conviction that, whatever further insight may be obtained into the phenomena and laws of the vast universe around us, the ultimate, though not the immediate result, must be in some way beneficial to mankind, either by administering to their physical necessities and comforts, or by improving their intellectual and moral character—these have been the principal inducements which have led the greatest geniuses among us, the master spirits of the age in which they lived, to devote themselves to philosophical and scientific pursuits; and it is thus that they have earned for themselves the respect and homage of the world. Nor can it be said that it is very different from this at the present time. For whatever worldly advantages the scientific inquirer may in some rare instances derive ultimately from his pursuits, the prospect of them is so distant, and so uncertain, that it can in no way enter into his calculation, or tend to divert his mind from other and more profitable undertakings. But a change is coming over us. The period has arrived when the discoveries of science, the achievements of former generations, are becoming extensively applied to the purposes of commerce, of manufactures, and the ordinary concerns of life. Then the numerous examples which have presented themselves of late years, of large fortunes rapidly accumulated, have afforded an additional stimulus (where none was wanted) to the natural desire of wealth; while the prevailing study of political economy, with all the great good which it has done, has produced this evil, that it has encouraged the disposition, in a large portion of society, to regard the increase of wealth, and the adding to our stock of luxuries and comforts, as the most important business of life. From this combination of causes it is that too many of the public are led to measure the advantages arising from the pursuit of knowledge by a lower standard than that by which it has been measured hitherto; estimating the value of researches in science by their consequences as affecting the physical well-being of mankind, and regarding those who apply the discoveries of philosophers to some practical purpose as if they were on a level with those with whom the discoveries originated. The danger to which I allude is, that the cultivators of science might themselves be led to participate in these utilitarian views. If it should be so, science must undoubtedly descend from the high station which it at present occupies. Nor can this happen without great injury to the cause of knowledge itself. The mere utilitarian philosopher, having his views limited to some immediate practical result, will be like the alchemists of old, as to whom Lord Bacon has observed that, 'assuredly the search and stir to make gold brought to light a great number of good and fruitful inventions and experiments, as well for the disclosing of Nature as for the uses of man's life;' but who, if they had continued their labours to the end of time, would have been no more cognisant of the laws of Nature than they were in the beginning. Eventually, even as to their gross material interests, society would be a loser. The sailor, pursuing his course over the trackless ocean, would never have had placed at his disposal the means of ascertaining the longitude, if philosophers, without reference to this object, had not studied mathematics and the laws of planetary motion; nor would London and Paris have ever been placed, as they now are, in instantaneous communication with each other, if those who began with the simple fact of the muscles of a frog's leg being made to contract by the contact of certain metals, had not pursued these inquiries until they reached the laws of voltaic electricity, never dreaming of the great invention which was ultimately to arise out of these researches in the shape of the electric telegraph. How many analogous instances might not be adduced, sufficient to satisfy the most thorough-going utilitarian that there are none who really contribute so much to the attainment of the objects which he himself has in view, as those who pursue science for its own sake, without reference to the practical results to which it may lead ultimately!

THE SECOND DIALOGUE.

Importance of Self-Knowledge—Necessity of Physical Power to great Intellectual Exertion—The distinctive Character of Man, his Capability of Improvement—Exercise the principal Source of Improvement of both the Physical and the Mental Faculties—One Sense supplies the Deficiency of another—Illustrations of this Rule—The Influence of Education in placing the other Conditions of the Mind under Subjection to the Will—Various Illustrations of the Phenomena and Laws of Memory—Artificial Aids to Memory—Peculiar Memories—Connection of the Imagination with Memory—Importance of the Imagination—The Judgment more improved by the Prosecution of the Inductive than by that of the Deductive Sciences—Perfection of different Faculties in different Individuals, the Excellence of one supplying the Deficiency of another—Patience, Diligence, and Perseverance—Influence of Conversation on the Development of the Mental Faculties, but Habits of Reflection best acquired at other Times.

It was on the morning after our last conversation that Crites thus addressed Eubulus:—

'When you took leave of us last year, referring to the duties which we owe to society and ourselves, you observed that "no one can perform them properly who does not regard his own powers, his own disposition, and his peculiar moral temperament, influenced as it may be by his physical condition and his mode of life, as a fit object of study, as much as anything external to himself." Now, agreeing with you in this opinion, it appears to me that this is a lesson which cannot be learned too early in life; and that the teaching it is a duty to the performance of which the attention of those to whom the business of education is intrusted should be especially directed.'

Eubulus. I suspect that it would be dangerous to lay down any express rule for young people, that they should look into and study their own characters; and that it would lead at least as often to self-conceit as it would to humility. But a judicious parent or a judicious tutor may accomplish the same object by other means, by availing himself of accidental opportunities of training the mind of his child or pupil in a right direction. In the observations to which you refer, I had in view chiefly those who are so far advanced in life that they may be expected to educate themselves; and it is then, and then only, when the lesson is forced upon us by the rough usage of the world, that it will be effectually learned. I need not repeat what moralists have so often told us, as to the necessity of correcting our propensities to evil and encouraging our propensities to good. But surely it is important that individually we should also do what we can towards the improvement of our intellectual faculties; and these are so bound up with our bodily condition, that we cannot, with any advantage, direct our attention to the one while we disregard the other. Each individual must study his own case. Habits of life in which one may indulge with apparent impunity, may be injurious to the intellect of another. What any of us may be able to accomplish, depends, in a great degree, on the extent of our physical powers. There are many who have attained the highest academic honours, and have been enabled immediately afterwards to enter, with all the energy required, into the active business of life, simply because the attainment of those honours was to them a comparatively easy task. But there are many others who have attained the same object with difficulty, and whose powers have been thereby so far exhausted as to render them incapable of any great undertakings afterwards.

ERGATES. It is a general law of the animal economy, that when the vital powers are from any cause depressed below a certain point, they are not easily, and sometimes are never, repaired. I have known persons who were otherwise healthy suffer from the effect of a large loss of blood for some years afterwards; and there are numerous instances of those who for a limited time have been subjected to great hardships and privations, who have never regained their former condition. In this age of keen competition, there are not a few who suffer from too great mental, as there are others who suffer from too great bodily labour, and who would accomplish greater things in the end if their exertions were more limited. In the way of illustration, I might, if I were so disposed, refer to instances both of professional men and of politicians who apparently from this cause have broken down in the middle of what appeared to be a noble and prosperous career. Much more might be said on the subject; but after all there is one simple rule, the observation of which is in itself sufficient: to make the most of the intellectual powers, the animal system should be maintained in a state approaching as nearly as possible to that of perfect health; and all those habits, whatever they may be, which tend in any degree to derange the animal functions, should be scrupulously avoided.

EUBULUS. There is, however, no necessary connection between robust health and superior intelligence. How often do we see the former combined with stupidity and ignorance! Travellers report to us instances of tribes of savages who intellectually appear not to be many degrees superior to the lower animals. The same may be said of the poor deserted children who have been sometimes found leading a lonely life, and maintaining a precarious existence in forests, apart from all human society. In his rude and uncultivated state there is little in man either to respect or admire. That by which he is distinguished, and which elevates him above all other creatures on earth, is his capability of improvement. The observation applies to individuals not less than it does to societies of men. Of two individuals, with perhaps equal capacities of mind, but placed under different circumstances as to education and as to the class of persons with whom they associate in early life, one may be found, after a lapse of years, to be comparatively stupid, while the other, as to intelligence, far surpasses what has been anticipated of him in the beginning.

CRITES. But here the question arises, 'Are all our faculties alike capable of improvement? and if it be so, is the same method of treatment which is applicable to one of them applicable to all the rest?'

EUBULUS. For all practical purposes it may be sufficient to lay it down as a rule that the faculties of the mind generally, like those of the body, are strengthened by exercise. To give an explicit answer to your question, however, we must consider the subject more in detail; and probably the prudent course will be to begin where our knowledge begins, that is, with the organs of sense. But, instead of entering upon it myself, I would rather refer you to Ergates, whose opinion on this, as on many other subjects, is more valuable than mine.

ERGATES. I really have little more to say respecting it than may have occurred to any one else. It may indeed be almost resolved into this simple rule: that our senses admit of being improved by cultivation as much as those higher faculties to which they are subservient. The sailor distinguishes a ship in the horizon which is imperceptible to the landsman. The practised musician has a nicer perception of musical sounds, of harmonies and discords, than the inexperienced artist. The painter who has become a master of his art recognises effects of shades and colours, and a multitude of things besides, of which he took no cognisance at all when he first entered on his profession as a student. So also the water-drinking Hindoo finds a difference of taste in the waters of different springs, which are alike insipid to the drinkers of beer or wine; and the worker in jewelry and gold ornaments acquires a nicety of touch of which the blacksmith can form no conception. It is, however, in those cases in which a particular sense has never existed, or has been permanently destroyed, that we learn to how great an extent other senses may be improved so as to supply the deficiency. In the earlier part of my life I made acquaintance with a blind fiddler, who wandered about the country by himself, attending village festivals; and I remember, among many other things which I have now forgotten, his having described to me how certain feelings, produced, as he supposed them to be, by the pressure of the air, made him understand that he was close to a large tree. Children who had been born blind, or who have become blind, learn to read with their fingers, by means of small embossed characters, in a shorter space of time than those who have their sight do by printed books. They become as familiar with the voice of their acquaintance as others are with their countenances; and it is really true that they not unfrequently wonder why, from being born blind, they should be held to be objects of commiseration.

I remember seeing a little girl three or four years old, who had been totally deaf from the time of her birth, watching her mother as she was speaking. The intensely earnest and anxious expression of her countenance when she was thus occupied was almost painful to behold; but the result was, that by a close attention to the motion of the lips, and, as I presume, by observing those smaller movements of the features which are unnoticed by others, she was enabled to obtain a competent knowledge, not indeed of what her mother said, but of what she meant to say. Examples of this kind may be supplied without end. There are few professions, and few pursuits in life, which do not require that some one organ of sense should be in a state of greater perfection than the rest; and each individual accordingly trains and educates that of which he is most in need, though he himself is unconscious that he is doing so.

The organs of sense are as much physical machines as the telescope, or the microscope, or the ear-trumpet; and in like manner, as the muscles become more developed, more vascular, and larger by being exercised, so it is not improbable some such actual changes take place in the organs of sense also, rendering them more adapted to the purposes for which they are designed. But this does not explain the whole. Any one who enters on the study of a minute anatomy, or what they are pleased to call *histology* (we are very fond in these times of inventing new names for old things), by means of the microscope, is at first very awkward in the use of the instrument. By degrees he understands it better, and is enabled to see what he could not see, or at any rate did not comprehend, in the beginning. So it is with regard to the organs of sense. We are clumsy in applying them to a new purpose, as we may be clumsy in our first attempts with an optical machine, but by diligence and attention we become more dexterous. What I am about to mention is no rare occurrence, and will serve to explain what I believe to be the correct view of the subject. A gentleman, who heard perfectly well with one ear, was thoroughly convinced that he had been perfectly deaf with the other ear from the time of his being a child. Bye-and-bye he became affected with a severe inflammation of the sound ear, and, when this had subsided, he discovered to his dismay that he had become quite deaf on this side also. After some time, however, on his being compelled to make a trial of what he called his deaf ear, he found that it was not really so useless as he had supposed it to be. By constant attention to the neglected organ, his capability of hearing with it gradually increased, and to such an extent that, with the help of an ear-trumpet, he could hear sufficiently well for the purposes of conversation.

Crites. Still you seem to be of the opinion that the more constant and more exact use of the ear, or the eye, or of the organ of touch, may ultimately lead to some actual physical change in their condition; and it being so, I do not see that you can well avoid the conclusion, that the greater development of any one of the mental faculties may be attended with some corresponding change in the organisation of those parts of the brain which are subservient to it.

Ergates. Indeed, I admitted what amounts to nearly the same thing when we were discussing the subject of the generation of new instincts last year. But what these changes are we have no means of knowing, neither can we form the smallest conception of them, so that our only safe way is to disregard them altogether. To extend the inquiry in this direction, or otherwise than as a branch of intellectual or moral philosophy, would be a hopeless undertaking.

I have told you what occurs to me as to the mode in which we learn to make a better use of the organs of sense. But I am aware that this goes very little way towards explaining the process of improvement as to the higher faculties. What is the nature of that process? Is it the same in all cases? or is one faculty to be improved in one way, and another in another way?

EUBULUS. Excuse me if I interrupt you by offering an observation in illustration of the questions which you have just proposed. In the account of one of Captain Cook's voyages of discovery in the Pacific Ocean, it is stated that nothing was more remarkable in the untutored islanders of that region than the rapidity with which they passed from one state of even violent emotion to another, as from joy to grief, or from anger to kindness. The fact is, that those states of mind which constitute the emotions and passions are all capable of being influenced by the will. We may give way to them, we may contend against them, we may by an effort of the will prolong or shorten their duration; and accordingly as we habituate ourselves to make the necessary effort, so does our dominion over them become more complete. This is the first moral duty which a good education imposes on us in childhood. It is the lesson taught us by the sermon on the Mount, and by the best heathen moralists. It is the basis on which civilisation rests; and if the highest civilisation in this respect falls far short of our ideal standard of what it ought to be, it is not because the principle is erroneous, but because man is imperfect. Now that which is true as to those mental conditions to which I have just adverted, is also true as to some of those which we class under the head of 'intellectual faculties.' The objects presented by the imagination are not summoned before us by any voluntary effort. Their presence, their absence, the order in which they appear, are independent of any direct influence which we have over them. Nevertheless, when they are brought before us, we can arrest them in their progress; we can look at them on every side, so that all their various relations shall be gradually presented to our view; and we can dismiss them when we please. All this is done by an effort of the will; and in proportion as we accustom ourselves to make it, so does that effort become more easy, and our dominion over the imagination more complete.

The power of continued attention differs very much in different individuals, according to the original construction of their respective minds. Thus in the case of two boys, apparently under similar circumstances, we may find one of them to have great difficulty in fixing his attention long enough to enable him to understand the simplest proposition in geometry, while the other accomplishes the same thing with no difficulty at all. But here also the defect under which the one labours may be in a degree supplied by education and practice, while the advantage which the other naturally possesses may be lost by neglect. A young man who has not been trained to gain knowledge by reading, will complain that, after he has read a few pages, his mind becomes bewildered, and he can read no longer; and I have known even those who have been well educated originally to make the same complaint, when, from being constantly engaged in the active pursuits of life, they have for many years neglected the habit of reading. On the other hand, the boy who is supposed to have *no head for mathematics* may by constant practice become a competent mathematician. It is the same in this case as in that of the imagination. The mind is kept fixed on one object, or succession of objects, by an effort of the will; and the more we are habituated to make the effort, the more easy it becomes to make it.

Crites. Of course it is the same as to our other mental faculties—the memory for example. A bad memory may be strengthened by exercise, and the best memory may be impaired by neglect.

Eubulus. I do not know that this is a matter of course, though I admit that what you say is true to a certain extent. As Dr. Hooke has observed, to remember anything an effort of attention is required; and as the habit of attention may be improved by exercise, so may the memory also. But it is only an indirect influence that the will possesses over this wondrous faculty.

Observe what happens with regard to an individual act of memory. We cannot remember an event, or anything else, simply by willing to do so; for to know what we wish to remember is, in fact, to remember it already. Take a particular example. You desire to recollect the author of a poem: you keep the subject before your mind until, by what is called the association of ideas or suggestion, some circumstances connected with it present themselves to you, such as the book in which you formerly read the poem in question, the place in which you were at the time, or the individual who quoted it, until at last the name of the author flashes suddenly upon you. Perhaps this may not happen until a long time afterwards, and when you least expect it. On some occasion formerly, two Latin lines recurred to my memory, of which I tried in vain to recollect the writer, or where I had seen them. I searched for them in various authors, and made inquiries of some of my friends, but without success. It was not until after the lapse of some five or six years that some accidental circumstance all at once reminded me that they were in a manuscript prize poem which had been lent to me to read, and which I had had in my possession only for a single evening, at least twenty years ago. Instances similar to this must be familiar to all of us.

It has happened to me (and I dare say that the same thing has happened to you) to have circumstances which had occurred when I was a boy, and which it might be supposed that I had entirely forgotten, present themselves to me again in a dream. The vagaries of our memory during sleep are indeed very remarkable: it seems to deal with things and events that have long since passed away, much more than it does with those which have occurred lately; and this is more especially the case as we advance in life.

ERGATES. What you have now mentioned may probably be explained by the well-known fact that the impressions made on the mind in early life are stronger and more lasting than those which are made afterwards. But there are other things connected with the memory which are not to be explained so easily. Take this for example. It has often occurred to myself, and I know that it has to others also, when some new event has taken place, to have a strong impression that the same thing has happened before, although I know that it is not and cannot be so in reality. If I am not mistaken, it was held by Plato that this is neither more nor less than some partial reminiscence of a former life.

Eubulus. It seems to me that the circumstance to which you have alluded admits of a much more reasonable solution than that offered by the Athenian philosopher. Is it not the case that on these occasions there is always an actual revival of some impression made on the mind formerly, though the events in connection with it have escaped from our memory? You will, I am sure, not think that I make too great a demand on your attention if I read to you an extract from a letter which I have received from a very intelligent correspondent, which throws great light on the subject, and which seems fully to confirm the opinion which I have ventured to express:—

'When I was about fifteen years of age, I went, with my father and mother and other friends, on a tour through Somersetshire; and having arrived at Wellington, where I had certainly never been before, we tarried an hour or two at the 'Squirrel' Inn for refreshments. On entering the room where the rest of the party were assembled, I found myself suddenly surprised and pursued by a pack of strange, shadowy, infantile images, too vague to be called recollections, too distinct and persevering to be dismissed as phantasms. Whichever way I turned my eyes, faint and imperfect pictures of persons once familiar to my childhood, and feeble outlines of events long passed away, came crowding around me and vanishing again in rapid and fitful succession. A wild reverie of early childhood, half illusion, half reality, seized me, for which I could not possibly account; and when I attempted to fix and examine any one of the images, it fled like a phantom from my grasp, and was immediately succeeded by another equally confused and volatile. I felt assured that all this was not a mere trick of the imagination. It seemed to me rather that enfeebled memory was, by some sudden impulse, set actively at work, endeavouring to recall the forms of past realities, long overlaid and almost lost behind the throng of subsequent events. My uneasiness was noticed by my mother; and when I had described my sensations, the whole mystery was speedily solved by the discovery that the pattern of the wall-paper in the room where we were seated was exactly similar to that of my nursery at Paddington, which I had never seen since I was between four and five years of age. I did not immediately remember the paper, but I was soon satisfied that it was indeed the medium of association through which all those ill-defined, half-faded forms had travelled up to light; my nurse and nursery events associated with that paper pattern being, after all, but very faintly pictured on the field of my remembrance.'*

Crites. I do not complain of the digression, which relates to a question which has often excited my curiosity. But you must excuse me if I revert to a former part of our conversation, the subject of which is far from being exhausted.

If the memory cannot be improved in one way, it may be in another. I refer especially to the various methods which have been proposed of artificial memory, and to some of which I myself frequently have recourse with advantage.

Eubulus. It is not very correct to say that these methods improve the memory. The more proper expression would be that they help it on special occasions, which is quite a different thing.

'Thirty days hath September,
April, June, and November,
February has twenty-eight alone,
And all the rest have thirty-one;
But leap-year, coming once in four,
Gives to February one day more.'

Here the rhythm of six lines enables us to recall to our minds thirteen facts, which, having no connection with any general rule, we might not easily remember otherwise. In the same manner the *memoria technica* of Gray enables us not to remember but to find out dates when we want them. Dr. Wallis,* who nearly two centuries ago was professor of geometry at Oxford, attained the power of making arithmetical calculations, 'without the assistance of pen and ink, or aught equivalent thereunto,' to such an extent, that he extracted the square root of three down to twenty places of decimals. We must indeed suppose him to have had originally some peculiar aptitude for such calculations; but he describes himself to have acquired it by practising at night and in the dark, when there was nothing to be seen, and nothing to be heard, that could disturb his attention. Dr. Wallis's communication to the Royal Society on this subject contains much curious information; and it is well worth your while to refer to it, when you have the opportunity of doing so.

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* For this interesting communication, the author is indebted to the kindness of the Reverend Thomas Bacon, Rector of Kingsworthy, Hants.

Some years ago an ingenious person, who called himself the 'Professor Von Feinagle,' delivered some lectures at the Royal Institution on a system of artificial memory which he had invented, and which seems in some instances to have led to some very remarkable results. The process was too complicated for me to trouble you with an account of it; it was moreover too laborious to be practically useful, and it is no matter of wonder that it should be now forgotten. The fact is (as I said before) that such artificial contrivances as this was, do not really improve the memory, any more than the telescope which enables us to see distant objects improves the sight, or an ear-trumpet improves the sense of hearing.

Ergates. In the course of our conversations last year, I mentioned several facts which seem to show that there is some kind of connection between the function of memory and the organisation of the brain; and it is easy to suppose that as in some persons there is a more delicate structure of the nerves of hearing, enabling them to have a nicer perception of musical sounds than is possessed by others, so there may be a difference in the organisation of that part of the brain which is in some way or other subservient to the memory, accounting for the great difference as to the degree of perfection in which we find this faculty to exist in different individuals.

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* Philosophical Transactions, vol. xv. p. 1269.

Eubulus. However that may be, and admitting that the memory may be improved by use and damaged by neglect, it is plain that there is a vast original difference in the power of memory in different persons. A Spanish theologian, Francis Suarez, is reported to have been able to repeat the whole of the voluminous works of St. Augustine by heart; while Montaigne speaks of his own memory as being so bad that he ought to be celebrated for its imperfection—at the same time consoling himself with the reflection that therefore he never could venture to tell lies. Then there are different kinds of memory. One person has no memory for names or other insulated facts, while he remembers with the greatest ease whatever can be referred to a general rule; in another it is just the reverse. Jedediah Buxton had a vast memory for figures; another finds it difficult to cast up even a few figures in a simple lesson in arithmetic. It may be said that all these differences may be resolved into the different degree of attention which, according to our respective inclinations and tastes, we bestow on different subjects. But this is not all; for you will repeatedly see one person who remembers things with what may be regarded as a moderate effort of attention, while another fails though he takes the greatest pains to do so.

Crites. I know that Montaigne complains on more than one occasion of his want of memory, and indeed, according to his own account of himself, it must in some respects have been bad enough. He says, 'I must have three hours to learn three verses;' and again, 'If any one would propose anything to me, he must do it by parcels, for to answer a speech consisting of several heads I am not able.' But the truth is, that his must have been an instance, similar to those which you have mentioned, of a person having a memory for one thing and not for another. The multitude of apposite quotations which he has made from books, and the variety of facts referred to in his essays, show that he possessed one kind of memory at least in great perfection, however much he may have been deficient in other kinds.

Do you believe that any one can accomplish any great things in this world, whether it be in general literature, in science, in politics, or in the ordinary affairs of life, whose memory is defective?

Eubulus. There can be but one answer to your question. In proportion as the memory is defective, so do we lose the advantage which we should otherwise derive from our experience of the past, of that knowledge by which alone we are enabled to anticipate the future. With an imperfect memory there must be but a scanty imagination, the images presented by the latter being altogether supplied from the stores already accumulated in the mind. The materials are the same, the only difference being, that in the two cases they are differently combined. I need not expatiate on the important place which the imagination occupies in all our intellectual operations; it may, indeed, well be regarded as the most important, as it is probably almost the peculiar, attribute of man. We are indebted to it for the greatest discoveries in science, the greatest improvements in the arts; without it, no one can arrive at excellence as a statesman, or as the commander of armies, any more than as a poet or the writer of romances. Observe that I speak of a well-regulated imagination, which is kept in subjection to the judgment; and not that wild imagination which is allowed to wander without control, and which leads to nothing but folly and mischief.

Returning to the subject of memory, I may observe that as there are different kinds of memory, so these are of very different degrees of value. Jedediah Buxton's memory of figures ended where it began. Dr. Wallis would have been just as great a mathematician if he had never performed those arithmetical exploits which I just now mentioned. He could have accomplished the same thing quite as well with a pencil and paper, and with a less expenditure of nervous force. If it be really true that the Spanish theologian knew all St. Augustine's works by heart, it does not appear that this was ever productive of any real good either to himself or to any one else. I did not myself know the individual; but I have been informed, on what I believe to be very good authority, of an instance of a young man who, after once or twice reading it, could repeat a rather long ballad, and yet, when he had done so, did not know the meaning of it. The memory which really leads to great results is that which is founded not on mere juxtaposition, but on the relations which objects and events have to each other: one suggesting another, so that they present themselves not as insulated facts, but as parts of a whole. It is this kind of memory which distinguishes the philosophical historian from the dry narrator of wars, and treaties, and party politics; which opens to the view of the scientific inquirer those resemblances and analogies by means of which he is enabled, in the midst of apparent confusion and complexity, to trace simplicity and order, and to arrive at a knowledge of the general laws which govern the phenomena of the universe; and which leads those whose genius takes another course 'to find in poetry its own exceeding great reward,' or 'to look for the good and the beautiful in everything around them;' at the same time that they become the benefactors of mankind, by transmitting wise thoughts and noble sentiments to the generations which come after them.

Crites. You may add—or rather the fact is included in what you have just now stated—that it is this kind of memory which affords the greatest help to the reasoning powers and the judgment, by giving us a broader view of the thing before us, and thus qualifying us for a more efficient exercise of these intellectual processes. But is not this in contradiction to the opinion which you expressed formerly, that the undisciplined mind reasons and judges not less accurately than that which has been the most highly cultivated?

Eubulus. It is not at all so if it be true, and I cannot doubt it being so, that the kind of memory which each of us possesses is a natural gift, and admitting of being influenced only to a very limited extent by any special education or training. I said that there might be little knowledge with much wisdom, and little wisdom with much knowledge, and that a child or a peasant may reason as accurately on the facts which he actually knows and comprehends, as those who have made it their business to study logic as a science; and I say so still. In the Exact sciences there is only one side to each question, and those who comprehend the data are inevitably led to one and the same conclusion, while those who do not comprehend them arrive at no conclusion at all. In the Inductive sciences, and in the ordinary affairs of life, the case is different. Here our judgment is to be founded on a comparison of the evidence on one side with the evidence on the other; and some minds are so constructed that they do this readily and at once, while other minds, having a more limited range, do so with difficulty or not at all, so that they seem to be scarcely capable of seeing both sides of a question. The investigation of the laws of reasoning is an important branch of philosophy; but in practice you will find that the ablest reasoners are those who follow their instinct, without reference to any of the rules laid down by logicians. The advantage afforded by a larger amount of knowledge on any given subject, is, not that it enables you to reason better, but that it gives you more sufficient data for the purpose. At the same time I admit that in this, as in other matters, the effect of practice is to make us more perfect. In other words, we may profit by experience, and learn, from every blunder which we make by drawing our conclusions too hastily, to be more circumspect and cautious afterwards.

The intellectual not less than the moral character of individuals is formed by a variety of circumstances. In some one faculty, in others another faculty, exists in greater perfection than the rest; and as, on the one hand, any one of them may run to waste if neglected, so, on the other hand, it may be improved by exercise especially during the early period of life. Much depends on early education, on the knowledge and the kind of knowledge which we have acquired, on the society in which we live, on our habits and worldly pursuits. One man may be stimulated by necessity, another by ambition, to make the most of the faculties, whatever they may be, which God has given him; another may have no such inducement to exertion; and hence it often happens that he of whom in early life a great deal is expected, is soon left behind in the race by another, of whom there had been no such sanguine anticipations.

You can form no real measure of the intellect by what appears on the surface. The most fluent speaker may be good for nothing else. Neither can you do so by observing the perfection or imperfection of a single faculty, for the excellence of one may compensate the deficiency of another. One man may have a greater capacity for long-continued attention, and for the acquirement of knowledge; another, who is his inferior in this respect, may nevertheless have the advantage over him by being endowed with a more keen and rapid perception and a greater capability of independent thought. We see those who devote themselves to books, and remember all that they have read, and others who have little disposition, and even find it difficult, to acquire knowledge in this manner, but who obtain the same result by observing and studying things themselves. The latter may indeed have a smaller amount of information, but they have a more real and substantial, and a more enduring knowledge. The intellectual powers may be above the average, and yet be exercised to little purpose, because the possessor of them, either from a want of self-knowledge or from the force of circumstances, is not in the place for which he is qualified. What would Cromwell have been if he had remained a brewer? or Moreau, if the revolutionary convulsion had not raised him from being a small attorney to be the commander of armies?

CRITES. You say nothing of the minor qualities of patience, diligence, and perseverance, which nevertheless play no unimportant part in all human pursuits.

EUBULUS. Do not call these the minor qualities; it seems to me that there are none really more important. They rarely exist except in combination with the higher order of intellect. Great hings are accomplished only by those who, confident in their own powers, view the far-distant object with a strong determination to attain it, and persevere in their efforts in spite of difficulties and disappointments.

> 'Pater ipse colendi
> Haud facilem esse viam voluit; primusque per artem
> Movit agros, curis acuens mortalia corda.'

The application of this rule is not limited to agriculture. Let no one persuade himself into the belief that he is to be carried forward by what he may be pleased to call 'the force of genius.' The most retentive memory, the quickest perception, nay, even the soundest judgment, will of themselves lead to no grand results. For these not only is labour required, but it must be persevering labour, not diverted from one object to another by caprice or the love of novelty, but steadily pursuing its course amid failures and disappointments. In fact, if there be anything which deserves the name of genius, those which you have rather incautiously designated as minor qualities are an essential part of it. Without them there would have been no advancement in Science, no improvement in Art; or, to express what I mean to say in a few words, there would have been nothing of what constitutes the higher form of civilisation.

There is one other quality not less essential than those of which I have just been speaking. For this I can find no other English name than that of humility; though that does not exactly express my meaning. It is that quality which leads a man to look into himself, to find out his own deficiencies and endeavour to correct them, to doubt his own observations until they are carefully verified, to doubt also his own conclusions until he has looked at them on every side, and considered all that has been urged, or that might be urged, in opposition to them. It is such habits as these which lead to the highest distinction, for they lead to a knowledge of the truth and to self-improvement. There is no other foundation for a just self-confidence. In this sense of the word the greatest men are humble. They may be proud—they are sometimes even vain; but they are never conceited. Self-conceit belongs to the smaller intellects—to those who, having in reality some dim perception of their own incapacity, derive consolation from comparing themselves, not with their superiors, nor even with their equals, but with those who are their own inferiors.

Although I fear that you are already wearied by my thus propounding to you my own notions, and that you may with good reason be ready to say 'We knew all this before,' yet I am tempted to tax your patience for a few moments more. There is a passage which occurs somewhere in the writings of Miss Martineau, though I cannot tell you exactly where to find it, which deserves the attention of those who wish to make the best use of their intellect. I do not remember the precise words, but they are to this effect, that it is important that whoever is engaged in the active pursuits of life should have a certain portion of the day in which he may be alone, in order that he may have the opportunity of communing in private with himself. In conversation with others our perceptions are rendered more acute; the mind works more rapidly; new views of things, even of those with which we are most familiar, present themselves as if it were by magic. They may be right or wrong, but they satisfy us at the time, as they help us in our argument. All this is good in its way, and we know that those whose minds have not been accustomed to be brought into collision with the minds of others are apt to become stupid, and (as in the case of long-continued solitary confinement) even idiotic. But, to turn what we gain from conversation to the best account, we require that there should be intervals in which our ideas may flow uninterruptedly, without being diverted in their course by the remarks of others. It is in such intervals that we best learn to think. I know not what may be the experience of others, but I acknowledge that in these ways I have not unfrequently derived an ample compensation for the wearisome hours of a sleepless night. Not only are hours of relaxation truly as necessary a part of education as hours of study, but I will go further than this, convinced as I am that, if we could unravel the whole chain of causes and effects, we should find that it has often happened that, in the solitary rambles of a pensive boy, the foundation has been laid of noble thoughts and great undertakings in the after-periods of his life. It is stated in the life of Sir Walter Scott that it was while he was a sickly boy, residing for the benefit of his health in a farm-house, some of those visions passed before his mind which in the after-part of his life assumed a more substantial form, and delighted the world in the pages of 'Waverley' and 'Old Mortality.'

THE THIRD DIALOGUE.

Influence of External Circumstances on the Condition of the Mind—To be counteracted in a great Degree by Voluntary Effort—Exercise of the Intellect necessary to its Healthy Condition, and conducive to Happiness and Bodily Health—Formation of Individual Character—Free-will and Necessity—Baron Alderson—Nervous Force expended in one Way cannot be expended in another—Emotions and Passions—The Intellect and Emotions Necessary Parts of the same System—State of Mind very much dependent on that of the Circulating Blood—This Rule variously illustrated—Man being a Gregarious Animal, his Relations to others cannot be overlooked—Cheerfulness of the Mind dependent on the Animal Functions being properly performed—However important the Mental Faculties may be in one Way, the Corporeal Faculties are not less important in another—Dangers to Society if the latter were to be deteriorated.

It was a bright morning in the early part of August. A thunderstorm on the preceding evening had cooled the atmosphere, refreshed the plants in the flower-beds, and moistened the earth which had been parched by the previous heat. The sun, still far below the meridian, with a few light clouds occasionally passing over it, rendered the air of an agreeable temperature. After breakfast we had strolled into the garden, and for some time it seemed that we had little leisure for conversation. At last our meditations were thus interrupted by Crites:—'You have told us how our faculties are to be improved by cultivation—how the power of attention may be weakened by neglect and strengthened by exercise—how great things may be accomplished by the bold use of the imagination, restrained at the same time within its just limits by the reason and the judgment—how much we may individually do to make or mar ourselves; and far be it from me to deny what you have said on these subjects. Still I am constantly and forcibly reminded of the great extent to which we are dependent on things external to ourselves, over which we have no control. Cooped up in my chambers during a London fog, with a headache produced by breathing a mixture of smoke and moisture, I am quite a different being from what I feel myself to be on an occasion like the present. In the one case, exertion is a painful effort; my mind works slowly; I sit down to my task with no willing spirit. But here, breathing the pure air, with a cheerful scene around me, my thoughts flow with ease, and the exercise of my faculties, so far from being a trial, is in itself a source of content and happiness.

Eubulus. In what you have now said you have only given us another instance of a fact as to the reality of which we are all agreed, namely, that the state of the mind, whether as regards the moral feelings or the intellect, is to a very great extent subjected to the influence of physical causes. But allow me to ask you this question. When you emerge from your chambers, under the oppression which you have described, and enter the Court of Chancery with an important case submitted to your care, do you really find yourself less capable of paying to it the necessary attention, or that you do less justice to your client, than if the air were clear, and the sun were to shine in brightly at the windows?

Crites. I must acknowledge that, however unwilling I may be to enter on it in the first instance, when once I have become fairly engaged in the work which I have to do, my previous state of mind makes but little difference. I am not aware that I am less ready in the use of my memory, or that my attention is less complete, or that my perceptions are less acute than the occasion requires.

Ergates. Eubulus's question sufficiently explains what is passing in his mind, and your answer to it confirms the opinion which he has intended to express. Indeed, no one, until he has been, as it were, compelled to make the necessary effort, can be aware to how great an extent the power of self-control is within our reach. It is not much to say that one whose state of health renders him fretful and peevish in his own family, may show no signs of his irritable temper when in the society of those with whom he is less intimately acquainted. On much greater occasions than this, the well-trained mind will come forth triumphant from a contest with the physical infirmities of our nature. A barrister of my acquaintance, who afterwards rose to the highest honours of his profession, was subject to a neuralgic disease, which so affected him that it often happened, when he had to advocate an important cause, that he entered the court in a state of most intense bodily suffering. But his sense of duty was greater than his sense of pain, and the latter was almost forgotten as long as the necessity for exertion lasted. The famous Cheselden, who at the same time that he was a man of science was also the most distinguished operating surgeon of the age in which he lived, thus graphically describes the feelings with which he had to contend:—'If I have any reputation in this way, I have earned it dearly, for no one ever endured more anxiety and sickness before an operation; yet, from the time I began to operate, all uneasiness ceased. And if I have had better success than some others, I do not impute it to more knowledge, but to the happiness of a mind that was never ruffled or disconcerted, and a hand that never trembled during any operation.'[*] The commander of a merchant-vessel laboured under a frightful local disease, of which it is unnecessary for me to describe the particulars. On his voyage homeward he was overtaken by a storm, during which it required the utmost energy and skill to preserve his vessel and its crew. For two or three successive days and nights he was constantly on the deck, watching everything and directing everything, as if he had been in the most perfect health. Then the storm subsided; he was again conscious of the sufferings occasioned by his complaint, and he returned home to die. In one of our former conversations, I referred to an observation of Lord Chesterfield's, that many a battle had been lost because the general had a fit of indigestion; and I presume that this may have been true as to such a Sybarite as Vendôme is represented to have been, but I cannot believe it to be at all applicable to great officers, such as Napoleon, Nelson, or Wellington.

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[*] Cheselden's Anatomy, 1740, p. 333.

EUBULUS. We have entered on an important chapter in the history of human nature. If to have such a dominion over ourselves as that which you have described be necessary for great achievements, it is not less necessary to individual happiness; and well is it for those who are compelled to exercise it by the circumstances in which they are placed. The necessity of exertion withdraws our attention from the minor, and, within certain limits, even from the greater evils to which we are liable. In having to contend with difficulties, we learn to overcome them, and thus are enabled to obtain one of the highest gratifications which life affords. Nor let us overlook the fact that the exercise of the intellect, if it be applied to a worthy purpose, is not less conducive to a healthy state of mind than that of the muscles is to a healthy state of the body; and that it is in itself a source of satisfaction and content beyond any that belongs to the indolent and the lazy. Compare those who, from the duties which belong to their situation, or from their own inherent energy of mind, are always occupied, with whom the pursuit of one object, when that object is attained, leads them to the pursuit of another, with others who, having no fixed purpose, have no better resource than that of striving from day to day, or even from hour to hour, to seek some fresh amusement for themselves; and see how different is the actual amount of happiness which they respectively enjoy. To be born to the possession of what are commonly held to be the advantages of life, is, in too many instances, a real misfortune. Small evils which cannot be avoided are magnified into great ones. The Duc de St. Simon, a hanger-on of the French Court, has, with a degree of simplicity which in these days seems marvellous, graphically expressed the anxieties, heart-burnings, and other evil passions, by which he was tormented, because his master, Louis XIV., did not accord to him on small occasions that precedence to which he thought that he was entitled. So in many instances we find a too earnest attention to those slighter bodily ailments, which, if left to take their own course, would soon correct themselves, cause as much discomfort as those who are better employed experience from actual disease. The *ennui* which is the necessary result of an over-abundance of leisure is not only painful and a mighty evil in itself, but it leads to still greater evils; the victims of it, in not a few instances, being driven to seek relief by resorting to low and degrading pleasures, while in others the circumstance of the mind preying on itself produces a permanent derangement of the general health, and even to such an extent as to shorten the duration of life. The mind and the body mutually act and re-act on each other. If a healthy condition of the body conduces to cheerfulness of mind, cheerfulness of mind is still more necessary to bodily health. In more than a single instance I have received a strange confession from one who might still be regarded as a young man, and of whom others would say that he was peculiarly blessed by fortune, that he was wearied of life, finding that there was so little of real enjoyment in it! I might mention another still more remarkable instance of a gentleman, endowed with considerable intellectual powers, of great accomplishments, and having great worldly advantages, who deliberately destroyed himself, for no better reason than that he found nothing that interested him sufficiently to make him wish to live.

CRITES. They may be, and I doubt not that they are, correct, but it must be owned that you have given us but melancholy views of human nature. If Nelson or Wellington had been brought up in the Court of Louis XIV., and exposed to the same temptations as Vendôme, they might have been as profligate and idle as Vendôme himself. The over-abundance of leisure, with all the miseries and mischiefs which follow in its train, is often a misfortune rather than a fault. It seems to me that, wherever we begin, we are always brought back to the same point, and compelled to acknowledge that we are but the creatures of circumstances, these circumstances being, up to a certain point, at least, independent of anything that we ourselves can do. It is not by his own choice that one boy is born and bred among thieves, or that another is spoiled by his parents and trained to idle and selfish habits.

EUBULUS. You may carry your argument further still, and say that we did not make our own minds; that we can but use the dispositions and faculties which God has given us; that our will is influenced by motives, as much as the movements of a clock are influenced by the spring which produces them, or the pendulum by which they are regulated; and thus you may find yourself involved in the metaphysical question as to necessity and free-will. Into that question I am not disposed to enter further than to make the following observations on it. *First:* Finding as I do the metaphysical argument to be entirely on one side, and my irresistible conviction to be entirely on the other, I am led to suspect that this is one of the subjects to which Ergates alluded formerly as being beyond the reach of our limited capacities. *Secondly:* that, even if we admit the doctrine of a necessity which rules our thoughts and actions to its full extent, the practical result is in no way different from what it would have been if we rejected it altogether. If I am not mistaken, it was the late Baron Alderson who on some occasion addressed a jury to the following effect, if not in these exact words: 'The prisoner is said to have laboured under an uncontrollable impulse to commit the crime. The answer to which is that the law has an equally uncontrollable impulse to punish him.* We may make an allowance for the external influences which operate on men's minds; we may excuse altogether those who labour under the illusions of actual insanity; but otherwise we cannot get rid of the feeling of responsibility as regards either ourselves or others: and the most thorough-going Necessarian, when he quits the loftier regions of Metaphysics to mix in the ordinary affairs of life, thinks and reasons precisely in the same way as the most unhesitating believer in free-will.

ERGATES. In short, whatever our speculative opinions may be, practically we are all constrained to acknowledge that, however much our intellectual and moral character may be influenced by external causes, more depends on ourselves than on anything besides.

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* Memoir of Baron Alderson, by Charles Alderson, Esq., p. 128. See Additional Note A, page 380.

This great truth cannot be too strongly impressed on the minds of younger persons by all those to whom the business of education is intrusted, whether it be parents, or tutors, or religious instructors. The wise man, having once learned this lesson, continues to educate himself during the whole period of his life. In doing so, he soon discovers to how great an extent his mental faculties are influenced by his bodily condition, and how necessary it is that he should regulate his habits and mode of life accordingly.

Eubulus. I need not say that I quite agree with you in the last observation which you have made, as I have myself more than once expressed the very same opinion formerly. I might indeed find much to say on the subject, for it is one that has often occupied my mind; but the questions which arise out of it belong rather to physiology, and I do not pretend to be a physiologist.

Ergates. Yet the study of it is not peculiar to the physiologist; he only goes shares in it with the moral philosopher. There is no one, whatever may be his condition in life, and having to exercise his wits even in the humblest way, who is not perpetually reminded that there are occasions on which his capability of doing so is affected by his bodily condition.

I probably have not much to say which may not already have occurred to yourself; and I must request of you to bear in mind that the subject has been frequently referred to by both of us on former occasions; so that as to many of the observations which I have now to offer, it is probable that they may call forth from our friend Crites the remark that I am but repeating what has been already said.

The nervous force is consumed equally in mental and in bodily exertion; and if over much of it be expended in one way, there must be proportionately less to be expended in another. The zealous student may be induced to obtain his knowledge at the expense of his digestion; while another, who is afflicted with an appetite for food beyond the actual requirements of his system, and thus imposes too hard a duty on his digestive organs, is rendered unfit for study.

It is too much to expect that children who have been working in a factory in the morning should profit from anything beyond a very short attendance on a school in the evening. If they do so, it must be at the expense of their bodily health, and probably not without injury to their constitution. Nor in the case of adults, with the exception of the very few whose physical powers and mental energies are much above the average, is it probable that those who have been laboriously occupied in the early part of the day will be able to accomplish much in the way of attaining knowledge and the improvement of their minds in the evening. Other things being the same, a state of perfect bodily health, in which all the animal functions are well and regularly performed, is that which is most favourable to the exercise of the mental faculties. If some persons of delicate health have been distinguished for their superior intellectual attainments, that is in great measure because they have reserved their powers for the last-mentioned purpose, and have not wasted them in other ways. You referred yesterday to instances of young men who after too severe a course of study have been for a long time rendered incapable of mental labour. Here we must suppose that the intellectual exertion has exhausted the stock of nervous force. But the same thing may happen in other ways, as the result of violent emotions, especially of the depressing passions, disappointments, anger, fear, anxiety of mind. All these operate in the same manner, by using up the nervous force, and therefore interfere with the exercise of the intellect. The man of business, whose mind has been agitated during a succession of dangerous speculations, must reckon on these being rendered still more dangerous in consequence of his judgment becoming impaired. He too will suffer in another way from the derangement of his animal functions and the injury to his general health; and this state of things, reacting on the mind, cannot fail to aggravate the original mischief.

Crites. Then it may be inferred from what you say, that if we suppose a person to exist whose mind is not subject to be in those states which you have designated under the name of emotions and passions, in him the purely intellectual faculties, such as reasoning, thought, and judgment, would exist in greater perfection than in others?

Eubulus. I will take the liberty of answering for Ergates that we can suppose no such thing. As, in the animal body, if you could take away the liver or the heart, or any other of the vital organs, so essential are these to each other that there would be an end of the entire system, so would the whole mind be at an end, or at least be rendered good for nothing, if any one of the faculties or qualities, or whatever else you please to call them, of which it is composed could be abstracted from it. It is only when those to which you have just alluded exist in excess that they have the ill effect which Ergates has pointed out; otherwise they are essential to the working of the whole, by affording motives for action, and by supplying materials for and exciting the imagination. In short, such a being would be beyond the pale of human nature, belonging to a mode of existence of which we can form no conception.

Ergates. You are quite correct in your observation. The mind may be in different conditions, and is constantly passing from one of these conditions to another; but it is always one and the same mind, and, in whatever state it may exist at the time, subject to the same influences. Thus, to take a familiar instance to which I have adverted in one of our former conversations, in an aggravated case of gout, where there is an unusual accumulation of lithic acid in the blood, the temper is peevish and fretful; fits of anger are produced without any adequate provocation, at the same time that, the capability of continued attention being impaired, the reasoning faculty and the judgment are rendered imperfect. So also, where, from the want of a due supply of food, there is an insufficient production of the nervous force, it is not in one respect, but in all respects, that the mind suffers. In the latter case the impoverished blood is deprived of those properties without which it is incapable of maintaining the functions of the nervous system; while in the former case it is not that anything is wanting, but that there is an undue proportion of one of the materials of which the blood is composed, and that to such an extent that it actually operates as a poison.

Crites. From what you have now said, and from what you said formerly, the conclusion is that the state of mind in any one of us is very much dependent upon the state of the circulating blood.

Ergates. Undoubtedly it cannot be otherwise, so far as the state of mind is dependent on the physical organisation. If a certain dose of opium causes its peculiar visions to be presented to the mind, and if a larger dose produces sleep, the narcotic poison must have first entered into the blood. So it is with chloroform, alcohol, tobacco, the Indian hemp, and a multitude of other agents which it is needless for me to enumerate.

Crites. But I suppose you will allow that it is only when they are admitted in excess that such agents are really deleterious. Otherwise, indeed, man, as an intellectual and moral being, must have been from the very beginning of history, and must still be, in a bad way; for there never was a time when one or more of the articles which you have enumerated were not in use, and under all forms of society, from that of extreme barbarism to that of the most highly-bred civilisation.

Ergates. I admit that it seems to be something like an instinct which has led mankind in all ages to have recourse to them; and that, even independently of the use of these things as remedies for disease, there is no one of them which may not, under certain circumstances, be actually beneficial. But a large proportion of the evils to which human nature is liable arises from the abuse of the natural instincts; and there is probably no one of these the abuse of which has been productive of greater evils than that which I have now mentioned. The most obvious example that can be adduced is in the case of alcohol. A moderate quantity of it taken into the system is productive of no harm, and may be really useful; but we all know how monstrous are the evils which arise from its being taken in excess. We are too often reminded of the degrading effects which this kind of intemperance produces, both on individuals and on society at large, for me to venture to occupy your time in expatiating on them. There are, however, two points connected with this subject on which I would make some remarks:—

First. It is not simply as a liquor producing absolute intoxication that alcohol may be injurious. One person may drink a pint of port wine or an equivalent quantity of some other liquor daily, and that through a long life, with impunity; while in the case of another, though never in a state of intoxication, the effect may be to render him dull in early life, prematurely stupid in his old age, and probably shorten his life ultimately.

Secondly. The evils arising from the use of alcohol have been fearfully aggravated by the invention of distillation. It is under the influence of gin and brandy, much more than of beer or wine, that bodily diseases arise, and it is alcohol in these forms especially that leads to acts of violence and crime.

Mutatis mutandis, what I have said as to the use of alcohol may be applied to other articles of the same class, such as opium and tobacco. The opium-taker is only negatively mischievous to society; he is dreamy and inactive, but nothing more; and it is worthy of note that the habitual use of opium does not, like that of alcohol, seem materially to shorten the duration of life. So as to tobacco. In the Polytechnic School of Paris it was found that the habitual tobacco-smokers were far below others in the competitive examinations. Tobacco-smokers, like opium-takers, become lazy and stupid, but they have not the vices of gin-drinkers. As to the effect of tobacco upon the organisation generally, I am inclined to think that it is more deleterious than opium, and more productive of disease, when the use of it is carried to excess.

If we had sufficiently accurate methods of analysis for the purpose, we should probably find in many instances that insanity may be traced to some alteration in the constituent parts of the blood, or to something added to it that does not naturally belong to it. A person of my acquaintance swallowed by mistake nearly a wineglassful of tincture of quinine. The first effect of it was to produce some very disagreeable symptoms affecting the head, which however subsided in about twenty-four hours. These were followed by a very inconvenient amount of deafness, which continued for several days. For some considerable time afterwards he was troubled with another symptom, the appearance of phantoms having the form of portraits of heads and faces with old-fashioned wigs, a large number of them presenting themselves at the same time in groups. These phantoms could be made to disappear by an act of the will, and might be conjured into existence in the same manner. There was therefore no danger of their being mistaken for realities, otherwise they would have been very like the illusions of a lunatic. Of other medicinal agents which are found to be useful in the treatment of disease, it is reasonable to suppose that there are none which, if given in too large a quantity, or continued during too long a period of time, will not do harm instead of good; and I might refer to instances of a state bordering on that of insanity being the result of such an abuse of remedies, and not subsiding until they were discontinued. Facts of this kind, however, may be regarded as belonging exclusively to medical science, and I do not therefore trouble you with any further notice of them. If such facts are of any value, it is not so much because they instruct us as to any definite rules of conduct, but because they serve to illustrate a principle which it would be well for every one to observe who is desirous of turning his faculties to the best account, so that the employment of them may be as useful as possible to himself, and, I may add, to others.

Eubulus. You have done quite right in making this last addition. Man is a gregarious animal, and as such is peculiarly situated; the gift of articulate speech bringing him into more intimate relations with others of his own species than we can suppose to be the case in the societies of inferior creatures. However selfish any one may be, these relations cannot be ignored; they come across him at every turn of his life; and if it be important that he should study his own condition with a view to what immediately concerns himself, it is not less important that he should do so with reference to his dealings with others. Ergates has, on more than one occasion, explained how in all of us the temper of the mind may be affected by certain conditions of the body, and how these again may be dependent upon our peculiar habits of life. Hence the same individual who is at one time peevish and ill-tempered, and apt to take offence, may at another time be quite the reverse. To be in what is called 'good spirits' is simply the enjoyment of those agreeable feelings which arise from the different organs of the body working well together, and from the animal functions being properly performed. One result of this is a cheerful disposition; but that implies a great deal more, for, however it may be in greater matters, it leads to sympathy with others in all the smaller concerns of life. Hence we find that those who by their personal influence have become the leaders of mankind have almost invariably been cheerful persons. There is, as Ergates observed in one of our former conversations, a state of mind in which every feeling has something painful superadded to it. No one, under these circumstances, can be habitually cheerful, and it is only by a constant effort to watch over his words and actions that he can compensate for this defect. Yet, if he would do justice to himself and be useful to others, the effort must be made. The effort may be more difficult to some, less difficult to others, but still it may be made by any one who has the right use of his reason; and although we may make a due allowance for those to whom the difficulty is the greatest, we cannot regard any sane person as altogether divested of that moral responsibility which is one of the conditions of human existence.

CRITES. Do you observe that you are now reverting to a question which you discussed in the beginning of our conversation to-day, when you remarked how 'the well-trained mind will come forth triumphant from a contest with the physical infirmities of our nature'?

Eubulus. In discussions of this kind such repetitions cannot well be avoided; there being so close a connection between the different parts of the subject, that in treating of any one of them we constantly find ourselves on the confines of another. Indeed, one principal difficulty in the study of that science which relates to the phenomena and laws of mind may be traced to the same source. Writers class the mental faculties as if they were absolutely distinct from each other; and indeed such a classification is necessary to the conduct of inquiries of this kind. But, in reality, as indeed Ergates has already suggested, those different conditions of the mind to which we give the name of the mental faculties, are so mixed up together, no one of them can be said ever to exist separately. For example, in a system of logic the imagination is altogether disregarded; but in practice it is quite otherwise, and even the pure mathematician would find that he could make but little progress in the advancement of his science, if he did not call in the aid of his imagination.

Crites. Without disputing the truth of anything that you have now told us, you must excuse me for saying that it seems to me that you are both taking but a one-sided view of human nature. Man is a compound of mind and body. You have explained how he is to make the most of those faculties which belong to him as a being endowed with intelligence; but you have said nothing of those corporeal faculties which he possesses in common with other animals. But assuredly it is no mark of wisdom to regard perfection of any one of the faculties with which we are endowed with indifference. In our anxiety for the improvement of the intellect we should avoid the error of underrating the aspirations of those who strive to excel in those things which belong to the body rather than the mind. Now little as I may excel in these ways myself, I hold that to be capable of enduring fatigue, of performing feats of strength, to be a perfect horseman, the surest marksman—these and such as these seem to me to be worthy objects of pursuit. I should be well pleased if like the *πόδας ὠκὺς* Achilles, I could contend with horses in a race; or if, like Ulysses, I could bend the bow that was useless in other hands; or if I could emulate Leander and Byron in swimming across the Hellespont. Although it is chiefly to the exercise of the higher functions of the mind that we are indebted for that more perfect civilisation which now exists among us, it cannot be denied that, if mankind had trusted to these alone, there would have been no civilisation at all. If it be true that man is inferior to many animals in all the applications of muscular force, in the strength of his limbs and of his jaws, and that his physical powers would have availed him but little in his contests with storms, and floods, and ferocious beasts, if they had not been under the direction of a superior intelligence, it is not less true that the latter, by itself, would have afforded him but a sorry protection against the various causes of destruction by which he was surrounded. Nor indeed is the case very much altered when the highest degree of civilisation has been attained. Knowledge and intelligence would never of themselves have been sufficient to produce those marvellous results which are everywhere manifested around us. It is by the intellect of one class directing the physical powers of another that we have been put into communication with the most distant regions of the earth. Without such a combination there would have been no navigation, no intercourse of nations, no railways; nor would that mighty engine which supplies the very limited population of our own island with a greater mechanical force than belongs to the 330 millions of the Chinese empire, have ever been called into existence, or controlled and managed even if it had been so. Then, even as regards individuals, we must not overlook the fact that there are a multitude of occasions on which the combination of intellectual with physical power is indispensable to great achievements. Taking all these things into consideration, is it not plain that the cultivation of the physical ought to be a subject of attention as much as that of the intellectual faculties in the early part of life?

Eubulus. The answer to your question is, that for the one purpose it is quite sufficient to trust to man's natural instincts, while it is not sufficient to trust to them for the other. A boy left to himself, without the help of a tutor, would run, and leap, and climb, and play cricket, and use his muscles in all sorts of ways; but it would be a very rare occurrence for him, of his own accord, to learn to read or write. The legislature, therefore, have done wisely in directing their attention to the latter object, and taking no account of the former.

Ergates. Any direct interference with the training of the corporeal faculties, even if it were possible, would indeed be ridiculous. Much, however, may be done, and much indeed has been already done, by means of the sanitary measures now in progress for maintaining the masses of the population in that state of general health on which the capability of physical exertion so much depends. At the same time it is plain that it is impossible to devise any sanitary measures which would do all that is required. It is not to be expected that the artisans in crowded cities, living in close habitations, and to a great extent indulging in intemperate and thriftless habits, can enjoy the robust health and the physical powers of a rural population. There needs no other proof of this fact than the difference in the actual mortality of the two classes. Unfortunately, it is shown by the returns under the late census, that while there is a great increase going on in the population of the larger towns, the population of the rural districts is diminished rather than otherwise. I own that I cannot contemplate such facts as these without some apprehensions as to the future. There may not be any great difference observable in the course of a single generation; but is there not danger that, after a few more generations have passed away, the race will degenerate, and that the mass of the population will no longer be distinguished for those powers of physical exertion, and that unflinching determination to overcome difficulties, which have hitherto contributed so much to the power and welfare of our country?

THE FOURTH DIALOGUE.

Human Happiness—Promoted by Civilisation—Theories of Happiness—Happiness affected not less by Physical than by Moral Causes—Enjoyment of Life experienced by Travellers sustained by simple Food and living in the open Air—Trampers and Gipsies—Some Doubts on the Subject—Feelings of Melancholy without any evident Cause, how to be explained—Ill-consequences of *Ennui*—Prison Discipline and Separate Confinement—Influence of Anxiety of Mind in deranging the Health and producing actual Organic Disease—General Conclusions—We must not expect too much of Life—The Fable told by Socrates in the 'Phædo'—Good and Evil necessary Parts of the same System—Origin of Evil—Relative Proportion of Good and Evil—Condition of the Lower Animals in this Respect.

Crites availed himself of an early opportunity of renewing the conversation in the following manner:—'I have been listening to your lecture on the management of the intellectual faculties, and I have no doubt that the healthy exercise of those faculties is in itself a source of enjoyment; while at the same time the opposite effect is produced by whatever tends to their degradation. Still it is plain to me that neither in the one way nor the other is the sum of human happiness materially affected. I know many who have had no advantages as to education, or, if they had, did not avail themselves of them, whose thoughts have been directed to the most ordinary pursuits, and who nevertheless seem to be really happier than some of my wisest and most highly-informed friends. But is not to be happy the first object which we have in view, mixed up in some way or another with every thought and action of our lives,—"our being's end and aim, for which we bear to live, and dare to die?" Without denying the importance of the subjects which we have lately discussed, it seems to me that it would answer a better purpose if we were to inquire how we should proceed so that we should pass through our pilgrimage here with the smallest amount of painful feelings; how we may be cheerful and contented, defying the evil and taking advantage of the good which lies in the path which we are to tread.'

Eubulus. I am not aware that those whose education and habits lead them to exercise the higher faculties of the mind have less actual enjoyment of existence than others. That society generally profits by the labours of those who in any way enlarge the boundaries of knowledge is plain enough, for these are the real civilisers of mankind. It might be sufficient for me to refer to what Ergates said on this subject on a former occasion; but it may be further observed, that as the advancement of knowledge leads to the advancement of civilisation, so it also tends to the prolongation of the average duration of human life. And from this last-mentioned circumstance we must presume that the result is, on the whole, a greater amount of happiness, as, with some rare exceptions, whatever tends to shorten life is productive of either physical pain or moral suffering.

But, before we proceed further, it may be as well for us to come to a more precise understanding as to what we are talking about; and I would ask, what is the exact meaning which you attach to the word 'happiness'?

Crites. Indeed, I attach to it none but the most commonplace and vulgar signification. I consider him to have the greatest amount of happiness who has the largest proportion of agreeable, and the smallest proportion of painful feelings, be they either physical, or moral.

Eubulus. What you call the most commonplace is, I apprehend, the most philosophical sense in which the word can be used. We must measure happiness, not by what lookers-on would say of us, but by what we feel ourselves. A man may succeed in all his undertakings, may be beloved by his family and friends, and enjoy the respect and esteem of the world; but you would scarcely call him happy if he laboured under a perpetual toothache. Do you remember the account which Pythagoras, then in the shape of a cock, is supposed to give to the shoemaker, in one of Lucian's

'Dialogues,' of his position when at another epoch of his transmigration he appeared on earth as a powerful sovereign? He describes how he was living in luxury; how he was worshipped almost as if he had been a god; how, as he was carried through the streets, the people assembled on the house-tops, admiring him and envying his condition; yet he adds that he could not help comparing himself to those large and gorgeous statues, the works of Phidias or Praxiteles, which are outwardly ivory and gold, but which, on the inspection of the interior, are found to be full of rats and other vermin.

CRITES. Your first illustration is quite to the purpose; but you might well have spared the second. I trust that the definition which I have given is sufficient to show that I labour under no such vulgar delusion as that which you mean to expose—against which we are warned not only by the best religious and moral writers, but even by the story-books which we have read as children.

EUBULUS. Do not suppose that I would pay you so ill a compliment as to attribute to you the belief that there is any intimate connection between the possession of great worldly advantages and happiness. That is as it may happen. They are good for some, especially for those who may look upon them as the result of their own exertions—they may be actually bad for others; while, for the most part, they are neither the one nor the other. My object was merely to bring us to the consideration of the manner in which the subject has been treated by others.

'Semita certè
Tranquillæ per virtutem patet unica vitæ.'

This is true, but it is not the whole truth; for we see every day that the most virtuous person may have his tranquillity of mind destroyed by circumstances which are not under his control.

At an early period of my life I was set to read a discourse on happiness by the learned author of 'Hermes;' but it was as a lesson, and I had not then sufficient knowledge of human nature or of the affairs of life to form a correct judgment as to what it might be worth. An accident led me to read it again lately; and I did so with that interest with which we are apt to return to the studies of our youth. After a long, and, I must add, rather a tedious argument, conducted, as the author believed, according to the Socratic method, the conclusion arrived at amounts to this, that the way to be happy is to be always under the influence of virtuous motives. But here also I say that this is true, but that it is not the whole truth. Practically we see that the most upright and virtuous intentions are not always rewarded by happiness in proportion, and that either moral or physical causes may operate so as to make a man miserable in spite of them. They may, and will, afford support under all circumstances, and especially in the case of those who feel that they may look with confidence to a compensation for what they may suffer here in a future and brighter state of existence; but they give no absolute exemption from the common lot of human beings.

Crites. All of which has been told us over and over again; and which no one, who sees what goes on in the world, can venture to dispute. But you may go further than this. Do we not daily meet with instances of those for whose moral qualities we have not the smallest respect—selfish people, who live only for themselves, for the gratification of their own passions, without regard to the feelings and claims of others—who seem to have their full share of such happiness as this world can afford to any of us?

Eubulus. Undoubtedly it is so to a certain extent, especially during the season of youth and vigorous health, while a rapid succession of events keeps the mind in a state of continued excitement, and affords no leisure for reflection. But I have lived long enough to watch the course of some such persons, and am led to believe that even in this world the day of retribution rarely fails to come at last. I have seen them, as they advanced in years, fall into a state of melancholy, amounting to hypochondriasis, for which even the most firm religious convictions afforded but an inadequate relief. A philosophical friend of mine has suggested that remorse is the destined punishment in a future state of existence. Be that as it may, I am satisfied that many, who do not own it, even to their nearest friends, are the victims of remorse even here on earth. Obvious examples of it in one of its forms are almost constantly presented to us in the daily journals, in the notices furnished by the Chancellor of the Exchequer of sums of money sent to him anonymously for 'unpaid taxes.' Is there anyone, even the best among us, who does not look back with regret at some errors which he has committed at a former, and perhaps distant period of life?

Ergates. The subject with which you began this discussion may be viewed under two different aspects, the moral and the physical. It is chiefly under the former of these that it has been viewed by the theologians and moralists who have professed to instruct us as to the surest means of obtaining happiness; but it deserves fully as much to be viewed under the other aspect also. We approached the consideration of it in our conversation yesterday, when I explained that the common expression of being 'in good spirits' means neither more nor less than this, that they are those agreeable feelings which are the result of the different bodily organs acting harmoniously together, and of their various functions being well and regularly performed. The condition of which I speak may be regarded as the most perfect state of animal existence, and I doubt whether there is anything in human life that affords to the individual a greater amount than this does of actual enjoyment. It might not, indeed, suit your ambition; but you may be consoled by the reflection that it is not altogether incompatible with the highest cultivation of the intellect. Therefore it is not beneath the dignity of the greatest philosophers to entertain the question how this object can be best attained.

Crites. That question being equally important to us all, philosophers or otherwise, we shall be very glad if you will tell us how to answer it.

Ergates. The subject has been treated of, in one way or another, by a multitude of medical writers, who tell you how to eat and drink and sleep, and everything else. But I do not much advise you to read their books, lest you might be perplexed by the discrepancy of the opinions which they contain. Thus I have in my mind at present three treatises on diet, in each of which there is a list of proscribed articles of food. But these lists are different, and if you were to adopt them all, you would find very little left to eat. Some very simple rules indeed are all that can be suggested, and each individual must apply them as well as he can to himself. A reasonable indulgence, without the abuse of the animal instincts; a life spent in a wholesome atmosphere, and as much as possible in the open air; with a due amount of muscular exercise. Really there is little more to say.

The agricultural labourer is tempted, by the prospect of higher wages, to migrate to a manufacturing town: he might well have been content with his former lot. In the one case he breathes an untainted air; the wheaten bread which forms the staple of his food is easy of digestion and sufficiently nutritious; and, even if he were inclined to it, his slender finances do not admit of much indulgence in the luxuries of spirituous or fermented liquors: while, in the other case, he is not only obliged to breathe the air of a crowded city, but probably of an ill-ventilated factory; being also too often tempted by his larger wages, and the society in which he lives, to indulge in sensualities which are mischievous alike to the body and the mind. Which is the happier condition of the two? The reports of the Registrar General supply an answer to the question. The average duration of human life in the agricultural districts is beyond that of the great cities; and, for reasons which Eubulus has already given us, I do not know that we can have any better measure of the relative amount of happiness in any two classes than the rate of mortality affords. Travellers in foreign countries far removed from civilisation, exposed to the vicissitudes of the seasons, often with no roof to cover them at night, and even with a precarious supply of food, describe this mode of life as having in itself a peculiar charm, which may fairly be attributed to the robust health which they enjoy under these circumstances, living as they do in the open air, and being debarred as they are from mischievous indulgences.

EUBULUS. That may be in part the right explanation of the satisfaction which it is said that such a wild life affords. But I suspect there is something more than this. There is the novelty of being suddenly relieved from the restraints belonging to civilised society, of which we are scarcely conscious while they exist, but which cannot fail to be sufficiently manifest when they are removed. I do not suppose that there are many, bred up in the midst of civilisation, who would long continue to prefer so great a change, though there may be some who would—as in the instance of a friend of mine, the late Mr. Salt, who at two different periods had lived among the Abyssinians, and afterwards filled the office of our Consul-General in Egypt. Mr. Salt was a highly educated person, accustomed to the society of intelligent men in London; and yet he has repeatedly declared to me that he found so much happiness in Abyssinia, that if it had not been for the separation from his friends, he would never have returned to his own country.

CRITES. In confirmation of the remarks which you have just made, I may mention that I know an instance in which a benevolent lady made acquaintance with a girl whom she found sweeping the street, and procured for her a situation as a domestic servant, with every comfort which such a situation could afford. The girl behaved very well; but she could not bear the change, and was very soon at her old employment in the streets again. I know another instance in which a similar experiment was made with a young person of the other sex, and with the same result. I have often been struck with the appearance of the gipsies and other trampers, who are found pitching their tents on commons and in by-lanes, and who, I must say, seem happy enough. The case of the gipsies is very much in point; they have been for some centuries roaming through the most civilised countries in Europe, and yet have never been persuaded to part with the freedom which their wild life affords, in exchange for the advantages of the civilisation by which they are surrounded. But do not facts, such as those to which we have just now adverted, tend to confirm the opinion which some have held, that there may be on the whole a greater amount of enjoyment of life in an uncivilised than in a civilised community, and that those whom we contemptuously call savages are, in this respect, really better off than ourselves?

Ergates. I put no faith in this speculation. The difference between a civilised and an uncivilised community is in the benefits arising from the larger amount of knowledge belonging to the former, as compared with that which belongs to the latter. The restrictions of savage life are at least as great as those which belong to civilisation, at the same time that they are of a more painful and onerous kind. You cannot read of the exploits of the kings of Dahomey and Ashantee, or the persecutions in the way of slave-hunting and accusations of sorcery among the races of Africa, as recorded by Dr. Livingstone and M. du Chaillu, without being satisfied on this point. At the same time, independently of all this, there is, from other causes, a much greater uncertainty as to life, arising from a less regular supply of food and the ravages of disease; so that, in these respects, the trampers and gipsies of this country are a great deal better off than the negroes. The ill-treatment of women among barbarous nations would be in itself a sufficient answer to your question. Abyssinia is much more civilised than the central parts of Africa; yet I suspect that, independently of the separation from his friends, Eubulus's friend, Mr. Salt, would not have been very well contented with his lot, if circumstances had compelled him to live there during the remainder of his life.

Eubulus. If anything were required to show how impossible it is, in discussions of this kind, to separate the influence of physical and that of moral causes from each other, the course which our conversation has now taken would be sufficient for that purpose; for, insensibly, from the consideration of the former we have passed on to the consideration of the latter.

But now allow me to ask you, as a physiologist, how you would explain a matter which has often attracted my attention, and which I have not been able to explain myself. On some occasions I have laboured under depression of spirits, having what I may call an abstract feeling of melancholy, there being no external cause to which it can be attributed, and it being at the same time, as far as I can judge, not connected with any derangement of any one of the animal functions. Several of my friends, with whom I have conversed on these subjects, have expressed to me that they have been at times similarly affected, some of them being much more liable to be so than others.

ERGATES. I will mention to you a circumstance which I recollect to have happened to myself when I was a boy, and which seems to me to throw some light on the subject. My brothers and I had undertaken a journey, to visit a relation who was staying at the sea-side waiting to embark for India. It was rather a long journey, and it occupied us two days on horseback. I had never before had an opportunity of seeing the sea, and I had looked forward to the visit with great expectation of the pleasure which it would afford me. I was, however, disappointed so far as this, that for the first two or three days I was actually unhappy, from a feeling of melancholy which I could not account for, and which I could not get rid of. Now, from observations which I have since made, I am satisfied that the real explanation was as follows:—I was not a very strong boy, and the journey had made too great a demand on my physical powers. As a general rule, whenever and in whatever way the physical powers are much exhausted, and there is an insufficient production of the nervous force, although you cannot say that any particular organ is in fault, the individual is liable to that condition of the mind which you have described. An inadequate supply of food will have the same effect. Some of my friends have complained of depression of spirits when first they awake in the morning, which is not relieved till after breakfast, and which probably arises from the long interval which has elapsed since the dinner of the preceding day without nourishment. M. du Chaillu describes a most painful state of the nervous system which he observed among the negroes in Africa, the result of a too long abstinence from animal food. The vegetable productions which form the sustenance of these poor people do not contain all the ingredients which the human system requires, and animal food is necessary to supply the deficiency. It is true that the peasantry of England, who can obtain but very little of animal food, do not suffer in this manner; but they have wheaten bread, which answers the same purpose. A want of the proper quantity of sleep operates in the same manner, as every one must have learned from his own experience. So it is with some medicinal agents, when administered in too large a quantity or during too long a period of time—iodide of potassium and colchicum, for example. When the spirits have been artificially raised by means of spirituous or fermented liquors, the exhaustion of the nervous force causes them to be depressed afterwards. From this state of depression a further supply of alcohol affords a temporary relief, and thus we perceive how the habit of dram-drinking is generated. It is the same with the smoking of tobacco. The excitement produced by the cigar is followed by a feeling of discomfort, which another cigar relieves; and thus the occasional is converted into the habitual smoker. Opium-takers are in the same predicament. An acquaintance of mine, who was subject to this unfortunate habit, said to me, 'I cannot describe to you the feeling of intense melancholy which sometimes comes over me, without my being able to give the smallest reason for it.' For its relief he had again recourse to opium, and thus the bad habit was kept up and strengthened.

The slaveholders of Cuba, who, by the amount of labour which they exact from them, shorten the lives of their unfortunate negroes, have this further sin to answer for, that such gradual exhaustion of the physical powers cannot fail to be accompanied by an unhappy state of mind. A more considerate and merciful legislature has interfered in the case of children employed in the factories of our own country, who might otherwise to a certain extent have shared the fate of the slaves of the Spaniards.

Crites. I can in some degree confirm from my own personal experience what you have said as to the effect of over-fatigue of either body or mind on the condition of the latter. But is it not also true that some amount of employment is absolutely necessary to our comfort, and that there is no much greater source of misery than the *ennui* which arises from the entire absence of occupation?

Eubulus. You may remember that I offered some observations on this subject in one of our former conversations. Nothing can be much more distressing than that state of mind in which the thoughts are not directed to any special object, constantly shifting from one to another, and finding nothing to rest upon. It lays the foundation not only of mental but also of bodily disease; and hence it is that instances are not rare of individuals who after a very active life retire, as they suppose, to be happy, but without having provided a suitable occupation for themselves, and who do not survive the change for more than two or three years. I read an account in one of the public journals of a literary man who, being a state prisoner, was condemned by a despotic government to solitary confinement, without being allowed the use of books or pen or paper. I hope, for the sake of humanity, that the statement was untrue; otherwise I cannot imagine an instance of more barbarous cruelty. And here I may take the opportunity of observing that I had myself, at one period of my life, considerable experience as to the effects of what has been called separate imprisonment of convicts in this country. In the prisons under the immediate control of the Government, the convicts are kept constantly employed, never communicating with each other, but attending the school and chapel, taking exercise out of doors, but passing the greater part of their time alone in their cells, being employed, however, in some kind of useful labour. Where this system is carefully conducted, there is really no material suffering either of the body or mind. The greatest harm that happened to the latter was, that some of the convicts, when first set at liberty, were affected with hysterical symptoms, which soon subsided, and did not prevent them from being useful labourers in the colonies afterwards. Still, without the precautions which I have mentioned, it is difficult to say what mischief might not have happened, both mental and bodily; and this fact ought never to be lost sight of by those who endeavour to carry out the same system in other prisons.

There is no doubt that there is nothing really more necessary to the enjoyment of life than constant occupation of the mind.

Ergates. You have referred to instances of bodily disease being the result of that unhappy state of mind, to express which we are compelled to employ the French term of *ennui,* for want of an equally appropriate epithet in English. Of course it is only when this state of mind is in excess, and continued during a long period of time, that such evil result follows. But here we find ourselves on the threshold of another inquiry of great importance, but too extensive and too difficult for us to enter fairly on it at present. I may, however, briefly remark, first, that there is too much reason to believe that long-continued anxiety of mind not unfrequently lays the foundation of actual organic disease, which, proceeding sometimes slowly and sometimes rapidly, destroys life ultimately; and secondly, that in a smaller way we have almost a daily experience of the influence which the condition of the mind has on the general health. The sudden apprehension of some great misfortune will almost immediately interfere with the process of healthy digestion. Those who, impelled by a too earnest desire to become suddenly rich, are engaged in a series of dangerous speculations, are never really in a state of perfect health; and I cannot doubt that, if we had the opportunity of tracing the history of a sufficient number of such persons to the end of their career, we should find that the duration of life is, in them, much below the average. The maxim of '*quærenda pecunia primùm est,*' which Horace describes as operating so mischievously in ancient Rome, is operating not less mischievously here; those who succeed in the race often being really as much sufferers as those who fail.

Crites. You must excuse me if I go back to some remarks just now made by Eubulus as to the effects of the system of separate confinement of prisoners in the Government prisons; recalling to his mind at the same time some other remarks which he made last year as to the desire which we have to live in society, and which, if I recollect rightly, he described to be as much an instinct as hunger and thirst. Surely it cannot be said that any amount of occupation can really render a life happy, when the gratification of such an instinct is absolutely prohibited?

Eubulus. I did not say that prisoners under this system are made absolutely happy; nor is it perhaps desirable that they should be so, for in that case there would be no punishment. What I said, or intended to say, was, that the ill-consequences which might otherwise have arisen may by proper management be prevented. Man is a gregarious animal, and suffers from the want of the society of those of his own race, in the same manner as other animals of the same class. Association with others is necessary, not only to his own comfort but eventually even to his existence; nor is it less necessary to the maintenance of his moral and intellectual character. It is a great mistake made by some sentimental writers, when they speak of the advantages of a retired life. Those who live much alone not only become stupid, but narrow-minded and selfish. It is by living in the world that we are rendered capable of judging what we ourselves are worth; that we are taught our own deficiencies, and at the same time what is due to others. I will take this opportunity of observing, though it may not be exactly to our present purpose, that although Walter Scott's observation, that the best part of every man's education is that which he gives himself, is quite true, nevertheless one who is wholly self-educated, however great in some respects his merit may be, labours under very great disadvantages; inasmuch as, not having had sufficient opportunity of comparing himself with others, he is in danger of placing too high an estimate on his own qualifications, and of believing that the knowledge which he possesses is peculiar to himself.

Crites. The conclusions from all that you have now stated may, I apprehend, be expressed in a few words. Our happiness in life depends, in a considerable degree, on circumstances which are altogether beyond our own control. Domestic calamities and mental or bodily disease may affect it, in spite of anything that we can do. But even here the effect may be modified to a considerable extent, as in one instance by a pure religious faith, in another by the conviction that we do not suffer from any ill-conduct of our own. But beyond this there is much depending on ourselves, not only on our own prudence and self-command, but also on the attention which we pay to our physical condition. Now all this which you have told me is really no more than I knew very well before. I acknowledge, however, that the illustrations which your physiological knowledge has enabled you to afford have caused me to view some parts of the subject under a different aspect from that under which I should have viewed them otherwise. What I am about to say, however, may not be undeserving of your attention.

There are not a few who make the great mistake of expecting too much of life, and in whom the disappointment which necessarily follows destroys no small portion of the comfort which life would have afforded them otherwise. Eubulus made some remarks on this subject in our last conversation, and referred to the cases of young men, born to the inheritance of what are considered as great worldly advantages, as being especially liable to be misled in this manner. The mistake, however, is by no means confined to individuals of this class. We see those who in early life have been acquainted with the inconveniences of poverty, who in the efforts to escape from them have toiled in the acquirement of wealth, as if they expected that wealth alone would afford them all that they could desire to have, and who yet in the end have been grievously disappointed. One man, when this great object has been attained, perhaps far beyond his original conceptions of it, is attacked by some organic disease of which Ergates would probably say that the foundation had been laid by his former labours and anxieties, and which, after a certain amount of suffering, consigns him to the grave. In another, under similar circumstances, the mind gives way, and in the midst of wealth he suffers all the evils of the poverty from which he had been so long labouring to escape. But these are extreme cases. There are others, and those more numerous, in which those who have amassed large fortunes by their own exertions become melancholy and hypochondriacal, partly perhaps from being deprived of their usual occupation, but in a great degree also because they have learned that the object for the attainment of which they had toiled, was worth so much less than they had expected.

Eubulus. I conclude that you refer to the examples (and those, I am afraid, are not very uncommon) of individuals who, having scarcely ever had any other object in view, have devoted themselves altogether to the acquirement and accumulation of wealth; and it must be acknowledged that you can produce none better to illustrate the proposition with which you set out. There is, as I apprehend, no pursuit really more degrading to the mind than this, nor more unsatisfactory in its results. But we are not to apply this observation to all undertakings in which men are engaged for their own advancement in the world. The statesman, who has guided his country through political difficulties, who has contributed to the promotion of education among the masses of the people, who has done his best for the improvement of the law; the engineer, whose genius has enabled him to throw a tubular bridge over the Menai Strait, or to bore a tunnel through the Alps; the painter, the sculptor, the architect, who leave behind them the memorials of their art for the admiration of posterity; the man of science, who has devoted himself to the improvement of the science in which he is engaged, whatever that may be; the merchant, who opens new fields of enterprise to the industry of others; the landed proprietor, who fulfils the duty of his station; these, and a thousand others, at the end of their career, may look back at their former labours with the satisfaction of knowing that they have contributed to the welfare of others as well as of themselves, and that they have a claim on the respect and estimation of society which the mere possession of wealth could never give them. Still I agree with you as to the importance of the mind being trained so that it may not expect too much of life; and it would be well that parents and others who are engaged in the business of education should keep this in view, and not leave the lesson to be taught only by their adventures in the world afterwards.

ERGATES. Do you remember the fable related by Socrates in the beginning of the 'Phædo?' Good and Evil were always quarrelling, and Jupiter had in vain endeavoured to reconcile them with each other. At last, being provoked by finding them so intractable, he punished them by joining them together, so that wherever one was to be found, the other should be found also. Indeed, it seems to be a question whether the co-existence of good and evil, or, if you please, of pleasure and pain, is not a necessary part of the system which is established in this corner of the universe, in like manner as, in a magnet or a voltaic battery, neither the positive nor the negative pole could have an independent existence; there being, however, this difference, that of the positive and negative poles each is exactly a complement of the other, whereas, as far as we can see, good and evil stand in no such mutual relation.

CRITES. We are here on the verge of an inquiry which has perplexed the greatest philosophers, namely, that which relates to the origin of evil, and the compatibility of its existence with the benevolence of the Deity. But I suppose that Eubulus would interfere by telling us that this is one of those metaphysical speculations to which he alluded in one of our former conversations as leading to no practical result, and which really would carry us beyond the reach of the human intellect.

ERGATES. I agree with you in the opinion which I suppose that you have intended to express, that such speculations are beside our purpose. At the same time I must say there were some other suggestions offered by Eubulus in the conversation to which you have alluded, from which, if we were to pursue them further, we might learn that the solution of the problem to which you have referred is not so very difficult nor so far beyond our reach as some have imagined it to be.

Another question, however, here presents itself, which, being of a more practical nature, I am not so willing to evade. What is the proportion which, in this world of ours, good and evil, or pain and pleasure, bear to each other? Some would have us to believe that the one, others that the other, greatly predominates. What is the real truth of the matter?

Eubulus. If different individuals give very different answers to such an inquiry, it is because they cannot fail to be influenced partly by their peculiar temperaments, and partly by the peculiar circumstances under which they are respectively placed. There are those who endure pain from bodily disease, and that during a great part of their lives; there are others who, through a long course of years, have little or nothing to complain of in this respect; and there is an equal difference as to moral suffering, whether it be induced by circumstances not under our control, or it be the result of our own mismanagement. On the whole, however, judging from such observations as I have been able to make during an active and busy life, I cannot entertain the smallest doubt that the good very greatly predominates over the evil, and that the individual cases in which it is otherwise are but rare exceptions to the general rule. There is much of good which, from the enjoyment of it having become habitual to us, we actually overlook. The condition of bodily health in which all the animal functions are well and regularly performed is in itself a state of happiness, constituting, as Ergates informed us yesterday, what is commonly called being 'in good spirits.' From constant and unceasing bodily pain there can indeed be no escape; but otherwise we can scarcely say that there are any instances of either physical or moral suffering which are not to a great extent relieved at intervals by better and happier feelings.

But are we not taking a too narrow view of this question, when we limit it to what belongs to the human race? Man, in his pride, is too apt to believe that all the world is made for him; yet the earth teems with life in other forms, even in regions never trodden by man, and in corners into which he cannot penetrate, and where it has no relation whatever to him. Now it cannot be denied that the lower animals have their share of whatever evil exists in the universe. Small birds perish from cold and hunger in a severe winter; the stronger oppress the weaker; and one species prospers and multiplies by the extermination of another. Still, I cannot look on the animal creation around me without being satisfied that its habitual condition is one of actual enjoyment. In one respect the lower animals are both better and worse off than man; they seem to have little recollection of what is past, and very limited anticipations of the future. While the joys and sorrows of man depend so much on the contemplation of what may hereafter happen, they live in the present hour, the object immediately before them seeming to supersede every other consideration. That such is the fact must be sufficiently obvious to any one who possesses common powers of observation; and if I mention the following anecdote, it is simply because it affords a rather curious illustration of it. I was told it by a gentleman who was an eye-witness of the circumstance to which it relates. In a hunt the hounds had very nearly reached the fox, when a rabbit crossed his path. Apparently forgetting his own danger, the fox turned on one side to catch the rabbit, and was soon afterwards himself seized by the dogs, with the rabbit in his mouth.

THE FIFTH DIALOGUE.

Advantage to be derived from the Intercourse of different Classes of Society with each other—Objects of Education—Schools for the Labouring Classes—What they may and what they may not be expected to accomplish—Those who are over-educated may suffer intellectually as well as physically—Exceptions to the General Rule—Objects of the higher kind of Education—Value of Truthfulness—Importance of Female Education—The Acquirement of Knowledge one Object, but not the principal Object of Education—Mathematics and the Inductive Sciences not so well adapted to the early as to the latter part of Education—Advantages of the Study of Language—Greek and Latin—Cultivation of the Imagination one of the most essential parts of Education—The Object of Education is, not that a great deal should be learned, but that whatever is learned should be learned thoroughly—Advantages of a Variety of Study in improving different Faculties of the Mind—Examinations and the Competitive System—The Example of Associates more effectual than Precept—Question as to Religious Education.

In our walks in the village there were few of the labourers whom we met with whom Eubulus did not claim acquaintance, while with some of them he entered more or less into conversation. One of us having made some remarks on the subject, he answered:—

'I do so partly on principle, believing that the isolation of the different classes, and the separation of them from each other, to such an extent as it exists in this country at the present day, is a great social evil, while I fear that it may lead to still greater evil, perhaps at no very distant period of time; partly because it is a pleasure to me to cultivate a mutual kindness of feeling between my poorer neighbours and myself; and partly also for another reason, as to which I am not quite so disinterested. We speak of the ignorance of the labouring population, especially in the rural districts, and it is quite true that they are ignorant of many things with which we are well acquainted; but, on the other hand, whoever takes the trouble of doing so, will find that they have much knowledge which we do not possess. It is with them as it is with those who belong to what are called the higher classes of society. There are some who are stupid, and many who are careless, and who never much learn to observe or think for themselves. But there are still others who make their own observations on what comes under their notice, and reason upon them with perfect accuracy; and from them I have often obtained what is to me both new and curious information. I believe I am correct in stating that in the manufacturing districts most of the improvements in machinery have originated with the artisans to whom the immediate management of the machines has been intrusted; and it is difficult to say how much of the improvements of agriculture may not, in the first instance, have been derived from the casual remarks and suggestions of farm labourers. However, it is not to matters of this kind that I intended more especially to allude. There are few subjects connected with rural life as to which I have not been able to turn my conversation with my rustic neighbours to a good account, natural history being one of them.

CRITES. You speak of the knowledge and intelligence of those who have had little advantage as to education. Am I to understand that you infer from this that education does not do so much for us as is usually supposed?

EUBULUS. Indeed I infer no such thing. Education may be, and often is, thrown away—the seed being cast on a barren soil. But education properly pursued never fails to produce a good result. Take the most intelligent of the labouring classes, and I well know that there is no one among them whose power of observation would not have been greater if he had had greater advantages as to early instruction; and under this conviction, when I first came to reside among them, I took an active part in establishing a parochial school, in which, under the immediate superintendence of a liberal-minded clergyman, the children of our village receive as much instruction as the peculiar circumstances under which they are placed enable us to afford them. Our school is a very important part of our little community, and I look forward with rather sanguine anticipation to the good which it will have produced in another generation.

Crites. I have had little opportunity of making myself practically acquainted with these subjects; but I do not doubt that your views are correct. Although my professional employments have afforded me convincing proofs that much vice may exist in combination with knowledge, and among those who have had the greatest advantage in the way of education, yet I cannot doubt the truth of what you stated formerly, that much of the evil which exists in the world may be traced to mere ignorance. Some statistics which I have seen, showing how large a proportion of those who are convicted of crime are unable to read or write, justify this conclusion. For my own part, I cannot understand why, with the opportunities now afforded them, and with the aid of the large funds contributed by the State, and the still larger by private individuals, the education of the labouring classes should not be carried much further than it now is. The human mind being much the same in all classes, we must suppose it to be everywhere equally capable of receiving instruction; and surely some general knowledge of geography, of natural history, of the physical laws of the universe, and even of animal physiology, may be communicated to the children of a parochial school as well as to others.

Eubulus. I am aware that in these days there are many who hold the opinion which you have now expressed. But according to my observation they prevail chiefly among those who look at these things from a distance, without having much practical acquaintance with the subject. It is, as I have already stated, most desirable that all classes should have some kind of scholastic education; and, with the means which are now available, the time certainly ought not to be far distant when those who are wholly uneducated will form a rare exception to the general rule. But the question is, what is the actual amount of education which those, whose lot it is to have to maintain themselves by their manual labour, may be expected to obtain? and I venture to say that what you suggest is much beyond that which can be generally realised. If the supply of labour were less than it is, in proportion to the demand, and the average price of labour were to be higher than it now is, the case might be different. As things now are in the rural districts, the necessities of the family are such, that the boys are generally taken away from school as soon as they are able to earn some small stipend by performing some minor duties in the fields. They rarely continue to be students for more than three or at most four years; and if they learn to read with ease, to write decently, and to perform some simple exercises in arithmetic, they have accomplished a great deal, and quite as much as those who belong to other classes of society would accomplish in the same space of time. Observe that I do not say that more than this would not be useful, but that, except under some very peculiar circumstances, more than this is impracticable; and that in this, as in other matters, we must be content to do, not what we desire, but what we can. The education of the girls, indeed, may, for the most part, be continued for a longer term; but we must recollect that of the time at their disposal a great part ought to be devoted, not to literary attainments, but to instruction in needle-work, and in what belongs to other domestic duties. Although personally I know little of what occurs in the manufacturing districts, yet I apprehend that the case of the children there cannot be very different from that of the children in the country. There they are sent to the mill at a very early age, as soon as they are able to add something to the weekly earnings of their parents. There is still a portion of the day in which they may be at school; but it must be, or ought to be, a very small portion: otherwise would it not be making too large a demand on their physical capacities? Is it to be supposed that a boy or girl who has spent the greater part of the day not only in manual labour, but in a tedious, irksome, and monotonous employment, would, as a general rule, be an apt scholar in the evening? or, if it were otherwise, will any knowledge that can thus be obtained be a compensation for the loss of that amusement and relaxation which is essential to health and happiness, and, I may add, to vigour of mind, at that early period of life? The more I consider the subject, the stronger is my conviction that as to the scholastic education of the labouring classes no more is to be expected from it than some such moderate instruction as that which I have already mentioned; it being at the same time provided that they have access to a good lending library afterwards. If anything more can be done, it must be under some peculiar circumstances, of such rare occurrence as in no way to affect the general rule.

Ergates. There is much truth in the vulgar proverb that 'all work and no play makes Jack a dull boy.' I believe with you that it is only to a limited extent that the education of children can be advantageously combined with bodily labour. Even in the case of grown-up persons some intervals of leisure are necessary to keep the mind in a healthful and vigorous state. It is when it is thus relieved from the state of tension belonging to actual study, that boys and girls, as well as men and women, acquire the habit of thought and reflection, and of forming their own conclusions, independently of what they are taught, and the authority of others. In younger persons it is not the mind only that suffers from too large a demand being made on it for the purposes of study. Relaxation and cheerful occupation are essential to the proper development of the corporeal structure and faculties, and the want of them operates like an unwholesome atmosphere or defective nourishment in producing the lasting evils of indifferent health and a stunted growth, with all the secondary evils to which they lead.

Crites. Still I am not convinced. I need only refer to the numerous instances which have been adduced of the pursuit and acquirement of knowledge under difficulties. How many are there, who, having begun life under the most disadvantageous circumstances, have at last become ornaments of the age in which they lived, as men of science, or moralists, or scholars, or even as poets! And I do not understand why, under a judicious management, the catalogue of individuals thus elevated in the scale of intellect and knowledge should not be greatly augmented.

Ergates. I am afraid that I have not made what I intended to say sufficiently clear. I referred to what must be regarded as the general rule, and I made an exception as to what may be accomplished under peculiar circumstances; as, in those very few gifted persons in whom an earnest desire of knowledge is combined with a corresponding amount of intellectual capacity and capability of physical exertion, I take it that it will rarely happen that, in some way or another, having once made a beginning, even with the humblest kind of instruction, they will not find the means of having their aspirations gratified. But it is not while in the parochial school, but afterwards, as they approach to man's estate, when they are accustomed to think and reason for themselves, that they will seek and find the opportunities of improvement. It was as a common soldier that Cobbett so trained himself as to become not only one of the most influential political writers, but also one of the greatest masters of literary composition of his day; and it was in an equally humble station that Ferguson found leisure, while pursuing his occupations in the fields, to lay the foundation of the reputation which he afterwards acquired as a mechanical philosopher and astronomer, and that Hugh Miller, as a stone-mason, grew up to be an eminent geologist.

Crites. I agree with you that such persons must depend mainly upon themselves. But you have yourself already admitted that something may be done in the way of assisting them in the process of self-education, when you mentioned the advantages arising from the access to a lending library. The so-called Mechanics' Institutes tend to the same result, and more still might be accomplished by the establishment of museums and lectures in the larger towns. Such institutions, indeed, would have a more extended influence by increasing the appetite for knowledge in all parts of the community. Those who are born to the enjoyment of ease and affluence would ultimately profit by them not less than those who are compelled to earn their livelihood by their manual labour. It must, I fear, be acknowledged that even among the former there is a large amount of ignorance, and much that is required to be done. How many are there on whom the opportunities of a complete and long-continued education have been thrown away, who go out into the world at last with nothing better than the outward show of refinement, and, from the want of some more worthy object, betake themselves to mean and frivolous, and too frequently even to degrading and demoralising pursuits!

ERGATES. I wish that I could dispute the correctness of your last observation. But does not this confirm the opinion which I heard expressed in a public lecture, by one of the most distinguished philosophers whom this country has produced, to the effect that there must be something wrong in the prevailing system of education among the more affluent classes, when it so frequently leads to no more satisfactory result?

EUBULUS. We must take human nature as we find it. In all classes of society there are a certain number whose minds admit of being trained only to a very limited extent; in whom there is a want of mental, as there is in others of physical power. Among those whose qualifications are of a higher order, there are some who love knowledge purely for its own sake. There are others who, not being wanting in their desire of knowledge, are also influenced by the prospect of obtaining reputation for themselves; and we must not complain of such aspirations, when we find that the consequences are so beneficial to the world at large. And here it may be observed that those who have to carve out their own fortunes for themselves possess a great advantage over those who are differently situated, inasmuch as it is with them a matter of necessity that they should make the best use of the abilities which they possess, whatever they may be.

Still, I do not mean to deny that there may be some defects in the prevailing systems of education. It would be marvellous if it were otherwise, considering how imperfect all other human institutions are. I do not profess to point out what these defects may be, nor have I, indeed, that practical knowledge of the subject which would make me competent to do so. I may, however, venture to suggest whether, as regards the higher kind of education, too much is not attempted to be done, and whether it would not be better if the students were left to accomplish more for themselves. But even as to this there can be no general rule; there being some who are incapable of learning anything except what they are actually taught, while there are others whose natural disposition it is to teach themselves and think for themselves. Unfortunately we have no means of distinguishing beforehand these two classes from each other; and even if we could do so, there would be a difficulty in varying our mode of proceeding so as to adapt it to each individual case.

Ergates. That may be true. And here I would refer to some remarks which you made in one of our conversations last year, as to the ill-effect produced by the great extension of the competitive system, in stimulating many to exertions beyond their powers, and in promoting the exercise of the faculty of learning at the expense of the higher qualities of observation and thought.

Eubulus. If we are to engage in the discussion of these subjects, it will, I conceive, be better not to enter into a critical examination of the prevailing systems of education, but rather to consider generally what are the principal objects which should be kept in view, and what it is that a well-conducted education may be expected to accomplish.

To begin at the beginning. It seems to me that the first thing is that a young person should be made to understand the value of truth, not only that he should never deviate from the rule of telling the truth, but that he should on all occasions desire to learn the truth, and do this to the best of his ability, not considering whether the result will be agreeable and convenient, or otherwise. Not only is this the surest foundation of the moral virtues, but without it the exercise of the intellect, on whatever it may be employed, can lead to no satisfactory result. This, you may say, is a matter so obvious that it scarcely deserves an especial notice; and yet it is to the want of a thorough conviction as to the value of truth, and the amount of labour and caution required for its attainment, that we may trace a large proportion of the disappointments to which we are liable in the ordinary concerns of life, as well as the many erroneous notions which have been from time to time propagated, and the fact that many things which at various times have passed for knowledge in the world have proved in the end no better than a sham and an imposture.

Crites. It is not indeed to be supposed that those who have acquired the habit of misrepresentation and exaggeration in common things can form a proper estimate of the value and importance of truth on great occasions; so that even when they have no actual inducement to deceive others, they may not be too ready to deceive themselves—drawing their conclusions from insufficient premises, being influenced by their prejudices and passions, and love of novelty, and, I may add, by their indolence. But this part of education belongs to the earliest period of life, long before the schoolmaster and college-tutor have entered on their vocations. The example of a lying nursery-maid during childhood may affect not only the moral but even the intellectual character of the individual ever afterwards.

Eubulus. Still, if we are to inquire into the subject of education, we must, as I said before, begin at the beginning, and not lay the blame merely on the nursery-maid. The bad example of the parents themselves, and their own bad management of their children, whether it be by a system of too great indulgence or of too great severity, will often do more mischief, by inducing a lax habit as to the telling or seeking of truth, than anything that goes on in the nursery.

Nor is it only in this respect that 'home-education' too frequently fails in the cultivation of those qualities which are essential to the right use of the intellect, leaving much to be undone by the individual himself, or by those to whom the special business of education is intrusted afterwards. The example of idleness and of frivolous pursuits, among those whose situation lifts them above the necessity of any regular or serious occupation, has, in too many instances, a most prejudicial influence, and places their children at a great disadvantage, as compared with those of professional men, and of others who are differently circumstanced in this respect. Those whose minds are of a higher order, it is true, overcome the difficulty; but the chances are that others will devote themselves to nothing better than the pursuits of their fathers and mothers.

Crites. But '*quis custodiet ipsos custodes?*' You are referring to evils which are so interwoven with the intimate texture of society, that to counteract them by any human means seems to be almost a hopeless undertaking.

Eubulus. To counteract them altogether is out of the question. Yet I am sanguine enough to believe that it may be ultimately accomplished to a considerable extent. Where the 'home-education' of children is deficient, that may be chiefly attributed to the imperfect mental cultivation of the parents themselves; and you have yourself already referred to one source to which we may reasonably look for an improvement in this respect. The fact of any one class in society being more thoroughly educated and better informed cannot fail to have an influence over others. If the superior classes allow themselves to be distanced in the race, they will find ere long that they are in danger of losing the position which they occupy, with all the advantages belonging to it. Money is power, which is certainly none the less from it being combined with the *prestige* of birth and rank; but knowledge and intelligence are a greater power still, and if the two should unfortunately be placed in opposition to each other, there can be, as I apprehend, not the smallest doubt as to which of them must ultimately prevail.

Ergates. You have certainly not overrated the importance of that early training of the mind which belongs to what you have called 'home-education,' affecting as it does the intellectual not less than the moral character of any one of us. And here be it observed, that under ordinary circumstances more depends on the mother than on the father; from which we may judge how necessary it is to the well-being of society that the education of the female sex should include studies of graver interest, and not be exclusively devoted, as it too often is, to the acquirement of those accomplishments which are merely graceful and ornamental.

Crites. But as you have begun the inquiry, I hope that you will pursue it further. It being granted that, by the influence of precept and of example, which is more effectual than all the precept in the world, a good foundation has been laid during the earliest period of life, what are the principal objects to be kept in view afterwards, when the business of education has been formally begun? And first, what is the kind of knowledge which is best suited to the capacities of a boy in the outset of his career as a student?

Eubulus. Certainly, from the beginning to the end, the acquirement of knowledge is an essential part of education. But I cannot regard this as the only object, nor even as the principal object—at any rate, it is not so in the first instance. The acquirement of knowledge is the instrument by means of which the intellectual faculties are to be exercised and developed, and brought into harmony with each other. The power of attention, industry, and perseverance—these are the qualities in which children are generally most deficient, and which stand most in need of cultivation.

Crites. But are not these qualities to be regarded rather as natural gifts, varying in degree according to the original structure of the individual mind? Ergates will agree with me when I add that they are also dependent on the physical organisation, the state of health, and other circumstances connected with the animal condition.

Eubulus. Undoubtedly there is a great original difference in this respect. Let us suppose a given number of persons, whose situation as to external circumstances is precisely similar; we should find that some acquire habits of industry and perseverance much more readily than others. By some the power of abstraction and long-continued attention to the thing before them is attained with ease, and by others not without an almost painful effort. So it is, also, with the power of reasoning. Some minds are so constituted that they are able to take cognisance at once of the evidence on both sides of a question, discerning their relative value, and, by something like a natural instinct, coming to a right conclusion; while others, having a more limited range, blunder on, never advancing beyond a partial view of the subject, and probably wasting a vast amount of labour in groping their way among small and insignificant details, the consideration of which, by diverting their attention from things of more importance, has no other effect than that of perplexing and mystifying the judgment. But as the muscles become weak, and as the organs of sense become obtuse, if not exercised, so from the same cause do the faculties of the mind, whatever they may have been originally, run to waste if neglected; while, on the other hand, there is no one of them which may not be improved by cultivation. The exercise of the mind required for the pursuit of any kind of knowledge, whatever its ultimate value may prove to be, will in a greater or less degree answer the intended purpose. The habit of idleness may be gradually converted into that of industry and perseverance—he whose natural disposition it is to wander from one subject to another may be made to acquire the habit of attention; and the result must be to make an imperfect memory more capacious and retentive.

CRITES. When you say that the pursuit of any kind of knowledge will answer the intended purpose, am I to understand that all kinds are in this respect alike, and that a good education may be obtained equally by means of any one of them?

EUBULUS. Certainly not. First, it is desirable that whatever knowledge is acquired should be such as may, in some way or another, be turned to a good account, and made the foundation of a higher knowledge afterwards. Then different studies require the exercise of different mental faculties. Mathematics, more especially geometry, and even common arithmetic, strengthen the power of attention, and therefore are peculiarly useful to those who are naturally deficient in this respect, while the higher mathematics are absolutely necessary to those who cultivate some branches of natural philosophy, as astronomy and mechanics. Further, mathematics being a deductive science, in which, a general principle being assumed, it is afterwards applied to particular cases, it renders us better qualified to deal with other sciences of the same class, such as jurisprudence and moral philosophy. Observe that I use the term 'moral philosophy' in its strict and literal sense, not applying it, as it has been applied by Dugald Stuart, to the science of mental phenomena generally.

But as questions in mathematics have nothing to do with degrees of probability,* the conclusion arrived at being either true beyond all possibility of doubt, or there being no conclusion at all, so the study of mathematics does not materially help us in those other departments of knowledge in which every question has two sides, and in which we have to compare the facts on one side with those on the other, and determine on which side the evidence predominates. It is the faculty of readily and accurately calculating probabilities which distinguishes what is commonly called a man of sound judgment, whether it be in the common affairs of life, in politics, in the investigation of history, or in the practice of professions; and for the strengthening of this faculty we are not to look to geometry or algebra, while great advantage may arise from the prosecution of some other sciences, such as natural history, chemistry, geology, or animal physiology. For this reason I apprehend that the introduction of some one or more of these inductive sciences into the curriculum of education, which is already to a certain extent taking place, cannot fail to be productive of good, at the same time that it will answer another purpose, by supplying a store of knowledge which may be turned to a good account at a later period of life; explaining many daily occurrences which would be inexplicable otherwise, unveiling many mysteries, and counteracting the influence of numerous deceptions and impostures, by which, even in the most civilised state of society, many individuals, from their ignorance of these subjects, are liable to be misled. Nor would it be difficult to show that such studies may administer to the personal well-being and advantage of those who prosecute them. Take, for example, the last of the sciences which I have enumerated, animal physiology: even a general acquaintance with it would enable us to know something of the causes which tend to derange the bodily health, and to regulate our course so as to avoid their operation; at the same time helping us to the acquirement of that self-knowledge of which we have spoken formerly, and as to the importance of which I believe that we were all agreed.

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* See Additional Note B, page 381.

Crites. Not at all denying the truth of all that you have now stated, still I cannot but believe that inquiries connected with mathematics and the natural sciences belong properly to the more advanced stage of education, and that they can be of little avail unless they are preceded by other studies, which are not only necessary to the study of the sciences themselves, but which can never be so efficiently pursued as at that early period when the memory is more active and more retentive than at any later period of life. Not only is it by means of articulate speech and written language that, whatever the subject may be, we obtain the most important part of our knowledge, but we use language as the instrument of thought. Without it we should be incapable of carrying on any but the simplest processes of reasoning. The study of language, which includes of course the study of grammar, is properly regarded, in all civilised countries, as that part of education which should precede all others. Of course some particular language or languages must be selected for the purpose. Whether, in this country, we are right in the preference which we give to the ancient languages of Greece and Italy, or whether Dr. Latham is right in the observation that these might be taught in some more philosophical and convenient manner than that which is usually adopted—these are questions as to which there may well be some difference of opinion.

EUBULUS. It was far from my intention to recommend the study of mathematics and the inductive sciences as the fittest subjects for the early part of education. I agree with you in all that you have said as to the study of language being the best and surest introduction to that of other things; and I may mention another advantage belonging to it, in addition to those which you have enumerated. The practical instruction as to the rules of grammar which a boy acquires is a good foundation for the study of the philosophy of grammar afterwards, and, if he be of an inquiring mind, will lead him to it; and this last is a branch of knowledge which, interesting and important as it is in itself, is rendered still more so by the fact of it necessarily including an analysis of the mental faculties, thus leading to the contemplation and study of the mind itself.

You have expressed a doubt as to the advantage of selecting the ancient rather than the modern languages for the early part of the educational system of the present day. You may remember that on a former occasion I made incidentally some remarks on this subject. The study of these languages, which we can know only from books, requires more thought, more attention, more exercise of memory, than that of our own language, or the kindred languages of modern Europe. The boy who sets seriously to work to make himself master of Greek and Latin, acquires a knowledge of grammar which he may easily apply to the language which he speaks himself. The tree may be known by its fruits. As a general rule, are not the best writers in the English language to be found among those who have been conversant with the Greek and Roman classics?

But it is not on these accounts alone that I should lament to see the day in which these studies were neglected. Can there be any compensation for losing the knowledge of Greek and Roman literature? Has it not been the foundation of the highest literature of these later times? Does it not provide for us a standard of taste, by a perpetual recurrence to which we preserve a purity of taste among ourselves? Is there any better exercise for the imagination, as we advance in life, than that afforded us by an acquaintance with the classical writers, the poets, the historians, the moralists of antiquity? Is there anything that can tend more than this to the cultivation and expansion of this great, this transcendent faculty of the human mind?

CRITES. You have, on other occasions, expressed yourself in somewhat similar terms as to the importance of the imagination. But does it not occur to you that this faculty, which you dignify with the name of transcendent, is often no better than an incumbrance, the exercise of it leading to all sorts of errors and mistakes? It really seems to me that if in the matter of education we concern ourselves at all about it, it should be rather to limit it, and repress its exuberance, than to foster and exalt it. Is it not those having a too lively imagination that, defying the rules of logic, become Mormonites and Ranters, and attracted by all sorts of visionary speculations, from the well-meant Utopia of Owen of Lanark, down to the quackeries of socialism and table-rapping? In the study of mathematics, the interference of the imagination is, as a matter of course, rejected altogether; while in the inductive sciences, as Bacon has shown us, our business is to collect facts, classify them, and draw our conclusions from them, without allowing either the one or the other to be distorted by it.

EUBULUS. Allow me to state the opposite side of the account. My remarks have been intended to refer to the imagination existing in combination with accuracy of observation and a sound judgment. The plodding man, who has great power of attention to the thing before him, but who, if he has any but a feeble imagination, rejects the use of it, may learn, as it were by rote, what others have taught; but he will be neither an inventor nor discoverer, and will really contribute nothing to the advancement of knowledge. There is an abundance of individuals who have some one faculty more than usually developed; but the really great intellects, which form the ornament and the glory of the age to which they belong, are those in which the different faculties exist in a just proportion, so that they may limit and control, and at the same time help each other. Imperfect as we all are, it would be alike vain and presumptuous to look for such perfection in this respect as our day-dreams might suggest; but it is only by those in whom there is some approach towards it that great things in any way are really accomplished.

Now there is no one faculty which is so constantly exercised as the imagination. If you could look into the inmost recesses of their minds, you would find that a large proportion of mankind live as much in the imagination as in the realities of life. It is so not only with the ardent youth who builds castles in the air, and conceives himself to be the leader of armies, who aspires

> 'To scatter plenty through a smiling land,
> And read his history in a nation's eyes,'

but it is so with many of the most sober-minded and matter-of-fact individuals among us. As we walk in the streets of London, there is nothing that we see in the shop windows, nor in the persons whom we meet, nor in the carriages which rattle by us, that is not suggestive of something else, of something that we do not actually see or hear, diverging into trains of thought and speculations having perhaps only a distant relation to the objects which are around us. The mind of him who sits before the fire, apparently idle, may be occupied with trifles, or it may be wandering over the visible universe, or soaring into higher regions still; but the imagination is always at work, ever restless, ever active, either for good or for evil. Under this view of the case, you cannot, I conceive, do otherwise than agree with me in the opinion that no part of early education is more important than the discipline of the imagination, so that it should be directed to worthy objects, not discouraged or repressed, but restrained and regulated.

Observe how important a matter this is in connection with morals. The boy who has been bred up among thieves will not be less imaginative than he whose more fortunate position has been in a more virtuous community; but how different must be the dreams and speculations of their leisure hours! Let us suppose two boys having an equally retentive memory, but that the mind of one of them is stored with the vulgar ballads which we see placarded on a blank wall in the streets, and that of the other with the most noble passages of the Greek and Latin poets, of Shakespeare and Milton, and consider how great will be the difference which these different attainments will make in their respective thoughts and conduct in all the relations of life afterwards! If the spoiled child grows up to be a selfish man, is it not because his imagination has been taught to speculate on the gratification of his own wishes and his own appetites, disregarding the just claims and rights of others? The imagination will be at work whether we will or not, nor should we wish to prevent it if we could. But the direction which it takes, while it depends partly on the original constitution of the individual mind, depends in a great degree also on the materials which it has to work with; and in this respect a great deal of good may be accomplished by the instruction and discipline of early life.

Crites. You must not suppose that I doubt the influence which the imagination exercises over the moral character. Still, I do not see what it can have to do with those intellectual processes the object of which is to ascertain the reality of facts, and to draw just conclusions from them, and which seem merely to require accuracy, patience, freedom from prejudice, and careful investigation.

Eubulus. You may remember that some allusions were made to this subject in one of our former conversations; and what I have to say on it now can be little more than an expansion of what I intended to express on that occasion.

For the mere learning what has been done by others, little else is required than the power of attention and a good memory. These are great qualities, but without other aid they will carry you no further.

If there be a question as to a mere matter of fact, where whether it be so or not is to be determined by a comparison of the evidence on one side with that on the other, it is the imagination which helps us to explore and collect the materials, the relative value of which is to be determined by the judgment afterwards.

The experimentalist arrives at a result at which neither he nor any other has ever arrived before. Does the whole truth flash on his mind at once? Far from it. It is when he makes it the subject of meditation afterwards that his imagination brings before him the relations which it bears to his previous knowledge, enabling him to look at it on every side, and to detect sources of error which he would otherwise have overlooked, and the detection of which may modify, or even entirely alter, the views which he had been led to adopt in the first instance.

As the imagination is the essential part of the genius of the poet, presenting to him analogies and relations which are not perceived by ordinary minds, so it is the main instrument of discovery in science and of invention in the arts. To the philosopher who enters on a new field of inquiry, it furnishes those lights which illuminate his path and lead him onward in his journey—fallacious lights indeed if he trusts implicitly to them, but far otherwise if he takes them for no more than they are worth, not supposing that they can in any degree supersede the necessity of strict observation and a hesitating and cautious judgment. Such is the history of all the great achievements in the inductive sciences; nor is it otherwise even with those sciences in which we have to deal, not with probabilities, but with absolute certainties. How many crude notions must have passed through Newton's mind before he completed the invention of fluxions! So it is with all other human pursuits, whether it be in the case of Marlborough or Wellington arranging the plan of a campaign, or of Columbus directing his course over the hitherto unexplored Atlantic Ocean, or of Watt engaged in the invention of the steam-engine. Wherever great things are accomplished, it is the imagination which begins the work, and the reason and judgment which complete it. It is the same thing on a smaller scale with the ordinary, and even with the humblest, occupations of life; and this being admitted, I revert to my original proposition, that the discipline of the imagination is an important part of early education. Here I may add, that the study of the physical sciences must be especially useful in this respect, inasmuch as they deal with matters of fact, which, being cognisable by the senses, afford us peculiar facilities of testing the accuracy of the views which the imagination has suggested, and of correcting the errors into which it might lead us by being too discursive.

CRITES. When we were speaking of the education of the labouring classes, you rather took me to task for expecting that more might be accomplished than can be accomplished in reality. But it seems to me that with respect to the higher kind of education you are yourself falling into the same error. Is it to be supposed that the mind of any young person can embrace all the variety of subjects which you have enumerated —language, the philosophy of grammar—the last, as you say, leading to the study of the mind itself—mathematics, the natural sciences? And may I ask, are all these really necessary to the objects which education has in view? Will not such a diversity of pursuit tend to perplex rather than to help an ordinary intellect—to heap up knowledge rather than to give a healthy and vigorous action to the individual faculties?

EUBULUS. Yet you will scarcely doubt that from this variety great advantages may arise. In one kind of study one faculty is more especially cultivated, in another another, and so on. Thus every variety of mind may find its suitable occupation, at the same time that no one faculty is absolutely neglected. Then, where the attention has been limited to a single object, narrow-mindedness, and a too low estimate of everything else, are apt to be the result—faults which, if corrected at all, must be corrected by others afterwards. Nor can it be doubted that he who, after his scholastic education is completed, enters on the active duties of life with a store of general knowledge, will be much more qualified to be useful in his vocation, whatever it may be, than he whose knowledge is more limited. At the same time it would be absurd to expect that every one should be an equal proficient in every branch of study. All that I contend for is, that while each individual devotes himself more especially to those inquiries which are most adapted to his peculiar taste and peculiar talents, others should not be absolutely and entirely neglected.

In saying this, I hope that I may not be misunderstood as expecting that all young persons during the period of education should obtain a complete and profound knowledge of the subjects to which their attention has been directed, nor even of any one of them. There may be some who, from a combination of superior mental with superior physical power, form exceptions to the general rule; but such exceptions are rare. To be a great Greek scholar, or a great mathematician, or a great anything else, must for the most part be a man's own work, after what is called his education is completed. This does not imply that we should be content with the attainments of the student being merely superficial. However little he may learn, that little should be learned thoroughly, so that his mind may be trained to habits of accuracy and perseverance.

ERGATES. Some of your late observations bring us back to a subject which we in part discussed formerly. For the more intelligent students there may be, I conceive, as well too much as too little of systematic education. Such persons, after a sufficient foundation has been laid, will do more for themselves than others can do for them. It is only by those who are thus to a considerable extent self-educated, that great things are accomplished afterwards.

The system of examinations which is now being extended from schools and colleges to professions and the public services, cannot fail to be useful if it be confined to the one object of ascertaining that the candidates have that amount of knowledge which is necessary for the position which they desire to occupy; but it will be otherwise if it be carried further than this, and especially if the principle of competition, to any considerable extent, be made an essential part of it. In a difficult and elaborate examination, those who have in the greatest perfection the capability of learning what is already known, though they may have nothing else, will have the advantage over those who observe and think for themselves; yet it is to the latter that we must attribute the higher order of talent, to whom we look for the greatest results, whether it be in the way of advancing knowledge, or in the more active pursuits and ordinary business of life.

Crites. *Aide-toi, et le ciel t'aidera.* I doubt not that this law applies to education as it does to everything else. But there is a subject connected with these inquiries to which neither of you have adverted, but which is especially of importance as involving that principle of self-education of which you have been speaking. Example is more influential than precept. In the formation of his habits and character, at least as much depends on the society in which a young man is placed, as on the instructions of his tutors. Idleness and industry, regularity and irregularity of conduct, in other respects are alike contagious, and the advantage of the best opportunities as to education will be thrown away on one who is careless as to the choice of his companions.

Eubulus. What you have now stated is quite true; but surely you do not mean to say that your remarks are applicable only to the earlier periods of life. Old and young, our thoughts and actions are liable to be moulded by those of our associates. A quiet man who joins a mob becomes infected with the feelings of those by whom he is surrounded, and takes a share in outrages which he would have shrunk from previously. The well-bred gentleman, who wishes to preserve his purity of taste, will do well to avoid dealing with sharpers on the race-course. I would ask Ergates if it be not true that when one young woman in the wards of a hospital is seized with paroxysms of hysteria, others do not follow her example? But here we are entering on questions which would lead us far beyond the limits of the discussion with which we set out, and on the consideration of which I am not myself prepared to enter at present.

CRITES. You have given us your views as to the requirements of education, but you have omitted one important subject. Am I to understand that religious instruction forms no part of your system, and that you consider education to have no other object than that of cultivating the intellect? If it be so, I must confess that my notions are very different from yours; nor can I conceive that to adopt such a system would be right as to those who are to be educated, or otherwise than dangerous to society at large.

EUBULUS. Nothing can be further from my intention than to recommend any course of study from which religion is to be excluded. But it is a delicate matter to treat of; and I own that I am not willing to enter into the discussion of it so far as to expose myself to attacks from dogmatic theologians. Thus much, however, I must venture to say, that the religious instruction of a young person should be of that simple kind which he can easily comprehend, teaching him that it is his duty to worship God, to love his neighbour as himself, and to cultivate that charity to others without which faith, that would move mountains, is nothing worth.

THE SIXTH DIALOGUE.

Natural Theology—Dr. Samuel Clarke—Derham, Paley, &c.—The Phenomena of the Universe governed by General Laws—But the Laws which are now in operation may not have been in operation always—Questions as to Equivocal Generation—Beginning of Animal and Vegetable Life the Result of some Special Interference of the Creative Power—Different Views entertained on this Subject—Darwin, and the Origin of Species—Probable Explanation of the Commencement of the Different Varieties of the Human Race—Facts favourable, and others unfavourable, to the Theory of Development—Partial Views of Metaphysicians on the one hand, and of Physiologists on the other —Dr. Prichard's Argument showing the Existence of Mind independently of Organisation—Mind of the Lower Animals—Speculations of Bishop Butler—Place of Man in the Scale of Creation—Articulate Speech and Written Language—Causes tending to the Advancement of Civilisation—Questions as to the Unity of the different Races of Mankind.

We were occupied in Eubulus's library, when Crites, who had been for some time engaged in looking over the books, apart from his friends, thus remarked:—'I see you have a long array of volumes relating to Natural Theology, beginning with Dr. Samuel Clarke, and ending with the Bridgewater Treatises. I am aware that many of these last contain much curious information, with occasionally some interesting general views as to the course of natural phenomena; at the same time it seems to me that works of this kind are scarcely required. With regard to Dr. Samuel Clarke's *à priori* argument, I must confess that it is to me incomprehensible; and as to the other argument, by which the existence of an intelligent Creator is inferred from the marks of design in the works of His creation, I do not see that we have really advanced much further than the Psalmist, when, some 3000 years ago, he inquired, "He that planted the ear, shall He not hear? He that formed the eye, shall He not see?"'

Eubulus. With respect to Dr. Samuel Clarke's speculations, I entirely agree with you. Being no German scholar, I have perhaps no right to give an opinion as to those of the great German metaphysician, Kant; though, from the account which I have read of them, I suspect that they are equally incomprehensible with those of Dr. Clarke. But with regard to some other writers, such as Derham, Paley, and the authors of the Bridgewater Treatises, although they may have produced no new argument in favour of the existence of a Deity, have they not done much to strengthen the old argument, by presenting to us so many important facts in illustration of it? And have they not done even more than that, by affording us some insight into the course which the Deity has thought fit to adopt in regulating the phenomena of the universe? The order and regularity in the course of events is, in some instances, too obvious to have been overlooked even by the rudest of mankind.. Thus, night succeeds to day; the full moon returns at stated periods; winter and summer regularly succeed each other. These, and a thousand other things, bear testimony to the fact that the phenomena of the universe are subjected to certain well-defined laws, from which, at present at least, there is no deviation. But, in a multitude of other instances, the same signs of order and regularity are not at once disclosed to our observation. Hence, in all ages, much of what goes on around us has been attributed to chance, as if that term, which is, in fact, only a confession of our ignorance, expressed something which had a real and substantial existence. Others have supposed that the natural course of events was continually interfered with in other ways. The uncivilised inhabitants of Africa, when their land is parched with drought, invoke the assistance of a rain-maker, and look for clouds and showers as the results of his incantations. The classical mythology of Greece and Italy filled the world with minor deities, who, even more than the gods of Olympus, interfered in human affairs and in the operations of nature. Ulysses is reported to have been preserved from the perils of the sea by an amulet given to him by a sea-nymph; and Horace, in compliance with the prejudices of his day, if not with his own belief, attributes the preservation of his life, when it was endangered by the falling of a tree, to the benevolence of a sylvan deity. The researches of science have opened to us wider and larger views of this universe in which we live. Eclipses of the sun and moon, which formerly were supposed to occur at random, and by which nations were alarmed, as being the portents of some impending evil, are now ascertained to be as regular in their occurrence as day and night, as the seasons and the tides. Wherever we extend our knowledge, the same signs of regularity and order are manifested; and it is plain that the minutest as well as the greatest phenomena are alike subjected to certain positive laws from which there is no deviation. Modern observations have instructed us in the law of storms; and we cannot doubt that even the smallest particle of dust raised by the wind pursues its destined course with as much certainty as the earth travels in its orbit round the sun.

Crites. It may be so. Yet I own that it seems to me a somewhat dangerous doctrine. There have been sceptics who have believed that the laws of nature were, if I may use the expression, self-existent; and that what we now see around us is but a continuation of a system that has been going on from all eternity—thus dispensing with the notion of a great creative Intelligence altogether.

Eubulus. Under any view of the subject, it seems to me that it would be very difficult, if not impossible, for any of us practically to separate the marks of design, and of the adaptation of means to ends, which the universe affords, but which are more especially conspicuous in the animal and vegetable kingdoms, from the notion of an intelligent Cause. There is not one of the sceptics to whom you have alluded, who would not, if he were asked the question, 'What is the use of the eye?' answer, 'that it is intended to be the organ of vision, as the ear is intended to be that of hearing, and as the nostrils are constructed for the purpose of smell.' But what I said just now requires some further explanation.

When I stated that at the present time there is no evidence of any deviation from certain established laws of nature—that if we could thoroughly know and thoroughly appreciate what those laws really are, we should be able to account for all the phenomena around us—I was far from intending to say that there has never been a period when other laws than those which are now in force were in operation, or that the time may not arrive when the present order of things will be in a similar manner superseded. Looking at the structure of the globe, and the changes in its surface which have been disclosed to the observation of geologists, we recognise the probability that there was a time when this planet of ours was no better than a huge aërolite, and in a state quite incompatible with animal or even vegetable life. The existence of living beings, then, must have had a beginning; yet we have no evidence of any law now in force which will account for this marvellous creation.

Crites. Then am I to understand that you would reject altogether the hypothesis of equivocal generation, which supposes that under certain circumstances, even at the present time, particles of inorganic matter are brought together, and so united as to become endowed with organisation and life?

Eubulus. The question is one of great interest, and I will refer you to Ergates for an answer, knowing at the same time pretty well what that answer will be.

Ergates. Of course Crites refers to the production of those minute creatures, known by the name of *Infusoria*, in the experiments of Walter Needham, and some others.

It is true that in these experiments certain vegetable and animal infusions, after no very long period of time, when examined by the microscope, are found to contain a multitude of minute creatures, of various forms, exhibiting signs of spontaneous motion, and multiplying their species in the usual manner. Some of these are even of a complicated structure, much beyond what might, *à priori*, be expected as the result of the first attempt of inorganic matter to enter into the realms of organic life. The subject has been so frequently discussed, that I need not trouble you with the details of the arguments which have led the most eminent naturalists to believe that these creatures are not really spontaneously engendered, but that they are derived from minute ova which are present in the air, and which, when placed under circumstances favourable to their development, burst into life: in the same way as the egg undergoes those changes which convert its contents into a bird, when placed under the influence of the animal heat of the parent. But even if this view of the matter be not correct, the case is not really altered; for, after all, the *Infusoria* are never detected except in vegetable and animal infusions, which necessarily presuppose the existence of organic life.

Crites. Then I take it for granted that you attach no credit to the story which Virgil gives us in the Georgics, of a swarm of bees being produced spontaneously in the carcase of a dead cow?

Ergates. Certainly I do not believe the conclusion at which Virgil had arrived; but substitute the word 'bluebottle-flies' for the swarm of bees, and I can understand on what foundation the story rests. These flies deposit their eggs in the flesh of the dead animal; presently you find these eggs developed into larvæ; and these, with the peculiar rapidity which belongs to insect life, are very soon converted into flies. We cannot suppose that Virgil, who shows that he had so well and so successfully studied the natural history of bees, could himself have made such a mistake; but it might well have been made by more ignorant persons, and the great poet may be supposed to have been misled by hearsay evidence.

Before quitting the subject of this so-called equivocal generation, I would take this opportunity of adverting to a circumstance which throws considerable light upon the question. Among the minute microscopic animals to which I have adverted, there are some which, though apparently dead, preserve their vitality, so that they may be revived after a very long period of time. Thus, for example, the minute animal *Vibrio*, which constitutes the peculiar blight of corn known by the name of the Earcockles, and of which a description has been given by Mr. Baüer in one of the volumes of the 'Philosophical Transactions,' may be seen in the form of a dry brown stain upon the glass, and yet, on being moistened, may be brought to life again, even so as to multiply its species, after a year's interval; and this experiment may be several times successfully repeated.

Crites. Then, if I understand you rightly, you have arrived at these conclusions. First, that there was a time when this earth was not in a fit state for the maintenance of either animal or vegetable life. Secondly, that in its present condition there is no evidence of any law being in operation which would account for any living beings being called into existence except as the offspring of other living beings which previously existed; and that from these premises we cannot fail to arrive at this further conclusion, that the first introduction of life on earth must have been by some special act of the creative power, of which we have no experience at present.

Eubulus. I suspect that this, really and truly, is all we actually know on the subject. But the inquisitive mind of man, on this as on a multitude of other occasions, has attempted to overleap those boundaries by which our knowledge is limited. There are two different speculations as to the beginning of the animal creation, each of which has its advocates. The more common of these is, that at different times animals have been called into existence, such as they now are; one creation disappearing and being succeeded by another, which was to disappear in its turn. The other speculation being, that some primordial germ was originally cast upon the earth, so artistically and wonderfully constructed that it contained within itself the rudiments of every animal organ that has since become developed; and that this, by a process of gradual transformation and multiplication in the course of a long series, I will not say of years, but of ages, has caused the earth to teem as it now does with its millions of millions of inhabitants.

Crites. If I were to choose between the two hypotheses, I must adopt the former as being consistent with the history afforded us by the Sacred Writings, and reject the latter as being inconsistent with it.

Eubulus. I must earnestly protest against this practice of placing questions in religion and questions in science in opposition to each other, as being equally detrimental to the cause of both the one and the other. The Inquisition at Rome subjected Galileo to the torture, because he asserted that the earth moved round the sun, and not the sun round the earth. But what Galileo taught has long since been universally believed, and religious faith remains unshaken. In our own time the discoveries of geology startled the minds of some pious persons, as if these were opposed to the history of the Creation contained in the first chapter of Genesis. Yet further consideration of the subject has shown that such apprehensions were unfounded, and religious faith remains undisturbed. The truth is that it was the object of the book of Genesis to instruct us, not in physical science, but in the relations of man to his Creator. Whenever and in whatever way the human race first began to exist on earth, that was the epoch of the creation of man. The theory of the gradual development of the multitudes of living beings from one primitive germ, as first propounded by the elder Darwin, and afterwards by Lamarck and the author of the 'Vestiges of the Creation,' has been not unfrequently viewed with suspicion, as if it had a tendency to Atheism. Yet there can be no greater mistake. Trace back this system to its origin, and you find that it takes for granted as marvellous an act of creative power and wisdom as can possibly be conceived. In saying this, however, you must not suppose that I am advocating the hypothesis in question; for really, notwithstanding all that has been said on the subject by the learned and sagacious author of the 'Origin of Species,' I find so many difficulties in the way, that I am very far from being convinced of its truth; and I think there is no one who will not find a great stretch of the imagination necessary to enable him to conceive that an oyster, a butterfly, a viper, and an elephant are all derived from one common stock, and are but different forms of one original element variously developed.

Ergates. The question is indeed a very wide one. There is abundance of evidence that the different species of animals are capable of undergoing certain transformations, so that what we now see may present appearances very different from those which the same species presented formerly. Sometimes these transformations take place gradually, in the course of many successive generations, as in the case of the despised, ill-treated, and ill-fed Bosjesman, or in that of the negroes who have been partially civilised in our West India Islands, and whose appearance is very different from that of their own race who have been taken on board the slave ships. At other times the transformation may be sudden, arising from circumstances which we cannot explain, and which we therefore call accidental. For example, there may be an Albino boy in a family in which there had been no Albino before. Let this boy grow up to man's estate, and marry, and it is probable that one or more of his children may be Albinos like himself. But let him marry an Albino woman, and all the issue of such a marriage may be Albinos, like their parents. Suppose two such families to be placed on an island by themselves, and then to intermarry, and there would probably then be a distinct race of Albinos, as there now is of negroes. It is likely that in the earliest stages of society it was in this manner that those great distinctions of the human race which now exist had their origin. The breeders of domestic animals well understand this principle, the operation of which is nowhere more distinctly manifested than in the various races of dogs. Mr. Darwin has well illustrated the subject by his experiments on pigeons; yet he has overlooked one very essential and important fact. The transformations to which I have alluded are confined to the external form, to the limbs, to the skin and its appendages. There are bandy-legged sheep, cattle with short horns or no horns at all; dogs with long legs and slim bodies, dogs with short legs, big dogs and little dogs; Albino rabbits and dark-coloured rabbits; and so on. The Dorking fowl has an additional claw; and in one instance only, quoted by Mr. Darwin, there was an additional bone in the spine of the pigeon. But these transformations do not extend to the internal and more important vital organs, nor to the muscles and nerves, nor even to the general form of the skeleton. The negro is distinguished by his woolly hair, by his projecting jaws, the shape of his legs and heel; yet it matters not to the student of anatomy whether the subject of his dissection be a negro or an European. Those organs which are the special objects of his study, the viscera of the chest and abdomen, the brain and nerves, and, I may add, the muscles, are similar in both. The same observation applies to the various races of dogs. However different their size and external form, as to the important organs, the dissection of one tells you all that you want to know as to the rest. But still further with regard to what belongs to external form, there is great reason to believe that animals, however much this may have become altered, have a tendency, if left to themselves, to return to their original type.

The main argument on which the theory of development of which I have been speaking is founded, is the resemblances and analogies, as to both structure and functions, which may be traced throughout the whole of the animal creation, and which make it appear as if the respective forms of it had been framed in a great degree according to the same pattern, partaking of a common character or type. In all of them life is maintained by the inhalation of oxygen and the conversion of it into carbonic acid, and by the assimilation with their own substance of matter which had previously formed a part of some other organic body, either vegetable or animal. Excepting those which are the very lowest in the scale, there are none which do not possess something that is analogous to muscles, brain, and nerves. The gills of fish, the air-cells of insects, correspond to the lungs of the other classes. The wings of birds represent the fore-legs of quadrupeds. It is needless to multiply examples of this kind, with which every one is familiar. But even if we admit that in the course of a series of ages these and other organs may have become gradually transformed one into the other, there are instances of other organs which seem to have had no prototype, and which suddenly appear in a limited number of animals, as if by some special act of the creative power. Of this fact, the poisonous fangs, and the gland for secreting poison, of the venomous snakes, the electric battery of the torpedo and other electric fishes, and the spinning apparatus of the spider, are obvious examples. There are no structures in other animals from which we can conceive that these have derived their origin. So that even if the theory of development be true, it cannot be said to contain the whole truth; and this is sufficient to make it doubtful altogether.

CRITES. Then I may conclude that you have not become a convert to this modern doctrine?

ERGATES. You may conclude no more than this: that the thing is so far beyond the limits of my experience, and that, in whatever way I look at it, I find the question so beset with difficulties, that I cannot venture to form any opinion on the subject.

EUBULUS. There is another difficulty in our way, to which you have not adverted. It is probable that, in some of the very lowest forms of animal life, the functions, such as they are, are performed merely automatically; and there is no reason to believe that these simple creatures are endowed with anything like sensation and volition, any more than vegetables. But, as we ascend in the scale of animal life, we find another principle superadded—a principle which, even in worms and insects, is the subject of sensation and volition, and which, as we ascend still higher in the scale, we find endowed with the faculties of memory, imagination, and thought, attaining their highest degree of perfection, with the addition of a sense of moral responsibility, in the human race. Now I can conceive it possible that such a supposed primordial germ as that to which you have referred may have contained within itself the rudiments of some at least of the various organic structures to be developed afterwards; but that is quite a different thing from it being the original seat of those functions which belong to the mind and intellect. I am aware that, coordinately with an extension of the mental and intellectual faculties, there is an extension and greater complication of the nervous system, especially of that part which we call the brain. But, *à priori*, we have no more right to say that the brain makes the mind, than that the mind makes the brain. In some modern works on Physiology, I see the mind spoken of as one of the properties (or, as they now call it, forces) inherent in matter, corresponding to gravitation, electricity, magnetism, and so on; the doctrine, in fact, being, that a certain arrangement of the molecules of matter in the brain leads to the production of mind, as a certain arrangement of metals and acids in a voltaic battery leads to that of electricity. But this is a doctrine which I cannot easily accept. I cannot perceive the smallest analogy between the processes of mind and what are called the forces inherent in the molecules of matter. There is so wide a gulf between them that one can in no way be compared with the other. I have no conception of any form of matter which is not essentially and infinitely divisible; the only thing of which I have any knowledge, which is essentially indivisible, is my own mind. The materials of the body, including those which compose the brain, are in a state of constant change. The brain of to-day is not the brain of yesterday, and probably there is not a molecule left of that which belonged to it a year ago. But, amid these changes, the mind preserves its identity. The belief in the identity of my own mind is as much inherent in me, and as much a part of my constitution, as my belief in the existence of an external world; I can in no way emancipate myself from it. It is said, indeed, that we have no experience of the existence of mind or intellect, except in combination with material structures; but is it so in reality? The answer to such a question has been briefly and clearly stated by the learned author of 'The Physical History of Man;' and I cannot do better than refer you to his own words:—'The whole universe displays the most striking proofs of the existence and operation of intellect, or mind, in a state separate from organisation, and under conditions which preclude all reference to organisation. There is, therefore at least one being or substance of that nature which we call mind separate from organised body, not only somewhere, but everywhere.'* However immeasurable the distance may be between the mightiest intellect of man and that of the Deity, it must be admitted that they belong to the same mode of existence; and I do not understand how anyone who believes in the existence of a Deity can receive without hesitation the doctrine that any kind of mind can be nothing more than the result of a peculiar arrangement of the molecules of matter. But, insensibly, I have been drifting back into the consideration of subjects which we discussed last year; and I remember that you, Ergates, on that occasion, adduced the same argument as that which I have just quoted from Dr. Prichard.

CRITES. I own that that argument seems to me to be very well founded, and it is somewhat remarkable that it should have been so much overlooked as it has been, both by physiologists and by metaphysicians.

EUBULUS. It is less remarkable as to the former than it is as to the latter. And here I am rather glad to have the opportunity of observing that these two classes of inquirers contemplate these subjects under very different aspects. The physiologist begins with making himself acquainted with the material structure of the animal body. He then studies the functions of different organs. He finds the action of muscles regulated by the ordinary mechanical laws of matter. The circulation of the blood is subject to laws similar to those which regulate the motion of fluid under other circumstances. The changes which the blood undergoes in the lungs and in the secreting glands are altogether chemical; the eye is as much an optical instrument as the microscope; and when he comes to the brain, he is too apt to regard the mind to be simply a function of the brain, in the same manner as the secretion of bile is a function of the liver. The metaphysician begins at the other end. He studies the mind irrespectively of the corporeal system; to him it has a reality of existence beyond that which he can attribute to the material world; and Dr. Berkeley and Arthur Collier have gone so far as to give reasons for doubting the existence of the material world altogether. Neither of these, as I apprehend, pursues exactly the right course. The human mind, as it comes under our observation, is to so great an extent influenced by the condition of the body, that it cannot be the proper object of study if the latter be disregarded; while the physiologist is equally wrong in regarding the mind simply as a function of the brain, overlooking the entire want of relationship between the phenomena which the mind exhibits and those presented by the material world.

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* Prichard on *Nervous Diseases*, Introduction.

Crites. Reverting to some of your former observations, I must observe that they lead to rather a strange conclusion. If the mental principle in the lower animals be regarded as belonging to the same mode of existence as that in man, then we must suppose that it has the same independence of organisation in the former as in the latter. But how opposite is this opinion to that which is generally entertained of the relations of man and the inferior animals to each other!

Eubulus. But I do not see at what other conclusion we can arrive, unless we adopt the hypothesis of Des Cartes, that the lower animals are mere automatons, whose actions appear to be directed by the sense and the will, while they are merely mechanical, like those of the puppets in the Marionette Theatre. On this subject, however, I may refer you to a much higher authority than myself; the question having been raised and sufficiently discussed by a learned divine, the author of the 'Analogy of Religion to the Constitution and Course of Nature.'

Ergates. The truth is, that the pride of man has led him to overlook the facts which you have now stated, and even to regard himself as if he were the only object for which the universe is created. In acknowledging the superiority of man to all the rest of the animal creation on earth, we must at the same time acknowledge not only the possibility, but the great probability, that there are in some regions of the universe organised beings endowed with faculties as much superior to those of man, as the faculties of man are superior to those of the humblest quadruped; and such beings might with as much reason regard us as having nothing in common with themselves, as we should deny the same thing to the animals below us. If I recollect rightly, Bishop Butler, to whom Eubulus has just referred, goes so far as to believe it probable that the future life which man hopes to claim for himself will not be denied to the lower animals. But, after all, this is one of those subjects which are so entirely beyond us, that it is a pure waste of time for us to speculate upon it. It is enough for us to have some faint glimpses of the intentions of the Deity as far as we ourselves are concerned; and it is not less idle than it is presumptuous to attempt to dive further into the mysteries of His government.

Eubulus. It would indeed be presumptuous to say that your speculation, as to the existence in some part of the universe of created beings very much superior to the human race, cannot be well founded; it being at the same time not at all so to assert that the gulf which separates man from other creatures with which we are acquainted is so great, that he may well be regarded as having a peculiar mission upon earth. Let it, however, be observed, that the superiority of man is to be looked for, not in what he actually is, but in what he may be made to be by cultivation. The raw material, indeed, seems to be but a poor concern. As was observed in one of our former conversations, his physical structure affords him no means either of offence or defence, compared to what belongs to many other animals. He has neither tusks, nor claws, nor rapidity of locomotion. The poor children who have been left deserted in the woods, as in the case of Peter the Wild Boy, and the Savage of Aveyron, although they have contrived, perhaps during some years, to provide a precarious subsistence for themselves, have, when discovered, exhibited very few of what may be considered as the characteristic attributes of man, and have rarely profited by instruction afterwards, so as to learn to speak; they have, indeed, generally been regarded as idiotic. The only advantage which man possesses as to his physical structure is that it is adapted to the greater powers of his intellect. His legs and feet are sufficient for locomotion, and leave his upper extremities at liberty to be employed for other purposes. The only creatures that have anything corresponding to his hands are the apes; but their hands, useful as they are for the purpose of climbing, are quite unsuited for those nice actions which belong to the human hand. If an ouran-outang were suddenly gifted with human intelligence, he would not be able to write or engrave, or make or polish a needle. In them, what we call the thumb is not a thumb in reality. Independently of its form and the position which it occupies, the muscles which belong to it are not such as would enable it to answer the purpose of a human thumb.*

But another distinction, beyond all comparison more important than that of the possession of a hand, is the faculty of articulate speech—a faculty with which no other animal than man is endowed; for we cannot with any good reason give this appellation to the barking of a dog, or the chattering of a monkey, or to the few words which a raven or a parrot may learn to pronounce without attaching a meaning to them. The voice of other animals is limited to the modifications of sound made by the larynx; and as such it is undoubtedly useful, as affording them the means, to a certain extent, of communicating with each other. But these modifications are limited in number, and would be quite insufficient to express the multitude of ideas or thoughts, or whatever you may be pleased to call them, which belong to the mind of man. The communications of some of the smaller insects with each other, by means of the contact of the *antennæ*, must be a more imperfect language still; but the varieties of articulate sounds, including their simpler combinations, are almost endless, and, being so, are thus adapted to the greater requirements of the human intellect. To creatures of a smaller intellect the same faculty would be useless.

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* For further information on this subject the reader may be referred to the interesting observations contained in Sir Charles Bell's *Bridgewater Treatise*.

Ergates. I cannot do otherwise than cordially assent to all that you have said on the subject of articulate speech. It may well be considered as being at the same time the most important and the noblest attribute of man. Not only does the possession of it imply a higher degree of intelligence than that which belongs to other animals, but the result of it is, that by the communication of knowledge from one to the other, and the discussion and interchange of opinions, it leads to a development of the intellectual powers far beyond that which could otherwise have taken place. Nor must we overlook the fact, that words are instruments of thought, without the aid of which it would be impossible for us to apply the reasoning powers which God has given us to any but the most simple propositions.

Eubulus. Articulate speech is the foundation of writing and printing. Written language, like articulate speech, is at once effect and cause; the invention of it is the result of the higher intelligence which man possesses, at the same time that it leads to a greater development of that intelligence in which it has originated. I need not repeat the oft-told tale of the influence which it has exercised in extending the boundaries of knowledge; but be it observed, that, like articulate speech, it is itself a help to the operations of the mind. Thus, for example, I at this moment perfectly well remember many pieces of poetry which I learned when I was a boy; but in bringing them to my recollection it often seems to me that I have before me the book and the very page from which I first committed them to my memory. I do not say that I read them off word by word; but there is the general aspect of the page, which, by association, brings before me what otherwise might have been forgotten. To those who are deaf and dumb, writing and printing are exactly the same as articulate speech is to those who do not labour under this calamity; as others remember words which are spoken, so they remember those which are written; and I cannot doubt that they answer to them the same purpose as instruments of thought.

Crites. Is it not reasonable to suppose that the written characters of the Chinese do not in this respect answer the same purpose as alphabetic writing, the latter exactly representing the words which are uttered, the former representing things themselves; so that the Chinese, Cochin-Chinese, and the Japanese use the same characters, although their oral languages are different? Is it not from the want of the more convenient alphabetic character that the Chinese, clever people as they undoubtedly are, have, for probably 2000 years, stopped short in the progress of civilisation?

Eubulus. Undoubtedly the influence of these two methods must be very different. In the case of alphabetic writing, the writing immediately brings to the mind the words which it was the intention of the writer to express; and, reciprocally, the words that are spoken at once suggest the written characters which represent them. It is not so as to the written language of the Chinese. The connection between the spoken and the written language is entirely arbitrary; they do not help each other; and hence it is, that to be a perfect master of the latter is almost the labour of a life.

The arts of writing and printing may well be considered as the greatest achievements of mankind, and have contributed more than any other inventions to aid a purer and more humane religion in the advancement of civilisation. Observe that I use that word in its best sense, as signifying the extension of knowledge and the humanising our species. But other things, many of which have been accidental in their origin, have undoubtedly contributed to the same result. How helpless an animal would man have been without the possession of fire! If the civilisation of modern Europe be of a higher kind than that of ancient Greece, this may well be attributed to the progress which has of late been made in the pursuit of the physical sciences, and to the influence which these studies have exercised on other branches of learning. But what would the physical sciences have been, if it had not been for the accidental discovery of glass, improved, as it was afterwards, by human ingenuity and skill? Without it there would have been no telescopes, no astronomy; and the sailor who now fearlessly traverses the Atlantic Ocean would have hesitated to conduct his vessel far from the sight of land. What would chemistry have been, if it had not been provided with glass vessels, combining the property of transparency with the capability of resisting the action of the most powerful chemical agents? If it had not been for the discovery of the uses of iron, which must originally have been accidental, we might still have been provided with no better cutting instruments than those flint knives and hatchets which are now exciting our interest as indications of the forlorn condition of our ancestors. Much might be said on this subject, but nothing more than anyone's imagination will readily suggest to him.

Crites. Another element mixes itself up with this question. Is there not a great difference in the intellectual quality of different races of mankind? Take the negro, for example, of whom we know more than of any other of those which are considered as the inferior races. The negro race occupies the greater portion of an immense continent, with all varieties of soil and climate. They are neither better nor worse than they were 2000 years ago, as rude and uncivilised as ever. Does not this seem to justify the opinion which some have held, that they should be considered as being really a different species, and the result of a separate creation?

Ergates. I know that is an hypothesis which has been propagated in the slave states of America; I cannot, however, admit it to be well founded. I need only refer you to some observations applicable to this subject, which I made in a former part of our conversation. The difference in structure in the negro and European races is like that which may be traced in the different varieties of dogs and sheep. The more important internal organs, those on which the maintenance of life depends, including the brain itself, are the same in both instances; in fact, the only real difference, and that a comparatively small one, is in the form of the skeleton, in the skin and its appendages. At the same time, I fully admit the inferior intellectual capacity, not only of the negroes, but of many other varieties of mankind. A friend of mine was in the habit of attending the negro schools in Sierra Leone; and his report of them was, that the children, up to a certain point, learned so rapidly that, to use his own expression, it was delightful to teach them; but that they could go no further. They have, by neglect, degenerated from the higher type of human nature. It is reasonable to conclude that, if properly cared for, they would gradually improve; and you may recollect that I formerly referred to the fact of the superiority of those negroes who had been for some generations domesticated and instructed in Jamaica, over the poor creatures who are brought to the island after having been delivered from slave-ships.

EUBULUS. But here we have entered on a field of inquiry of such vast extent, that, for my own part, I must confess that I cannot undertake the exploration of it. We have noticed some sufficiently obvious causes which tend to promote, as others tend to retard, the progress of civilisation. But there are many others. How much must depend on the form of government; how much on the soil and climate; on the influence of peace and war?* A long life would not be sufficient to enable the most diligent inquirer to answer all the questions that might be raised; and it would be idle for us to attempt to do so in the brief space of time which we can afford for a discussion of this kind. There is only one further observation which I shall venture to make. I do not doubt the possibility of negroes, or any of the other inferior races, being capable of improvement. But, even under the most favourable circumstances, such an improvement must be very gradual; and many generations of them must have passed away before it can be expected that they should even approach the point which has been attained by the more civilised communities of the present day.

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* See Additional Note C, page 381.

THE SEVENTH DIALOGUE.

The Pony and the thorough-bred Horse—Hypothesis of the 'Indefinite Perfectibility' of Mankind—Objections to this Hypothesis—Intelligence and Civilisation do not stand in any exact Relation to each other—Civilisation promoted by the Extension of Knowledge—Probable Improvement of the Mental Condition of the Inferior Races of Man, in the course of Time—Future Destiny of Man—Speculation as to the Future History of the Animal Creation.

The day had arrived which was to terminate our second visit to Eubulus; but an inspection of the time-table showed us that we had still some time at our disposal before it was necessary to proceed to the railway station. We had made acquaintance with a rough-looking pony, in the service of some of the junior branches of Eubulus's family, which we had sometimes met with in a neighbouring meadow, and it was in reference to this animal that Crites observed: 'Does it not seem remarkable that this humble quadruped should have sprung from the same stock with those beautiful thorough-bred horses which we lately saw in your neighbour's stables? Such a transformation cannot, I suppose, have been otherwise than very gradual, the result of careful culture during many successive generations. This simple fact is in itself one of great interest; but it has still a higher interest if we apply the principle on which it rests to the probable destinies of the human race. The civilised inhabitant of modern Europe is as much superior to the Australian savage as the thorough-bred horse is to your pony. In those pre-historic times when such flint knives and hatchets were in use as have lately been brought to light by geologists, the inhabitants of this very island were probably little above the condition of the Australian aborigines.

You and Ergates have told us how, in the human race as well as in animals, old instincts may be lost, and new instincts may be generated, which last are capable of being transmitted from the parents to the offspring. How much does the civilisation of modern times excel that of all former ages! Taking all these things into consideration, shall we be too sanguine in our views if we speculate on a period arriving, far distant as it may be, when the qualities of the human race will have attained a much higher degree of perfection than belongs to them at present; when the intellectual powers will be more largely developed, the moral sentiments more refined; and when many of those evils which are the result of man's imperfect nature, and by which even the best form of society is now infested, will be banished from the earth?'

EUBULUS. I must first say a few words on behalf of my pony, whose character you have not rightly estimated. It is true that he has not the elegant form, nor the ease and facility of locomotion, which belong to those thorough-bred horses to which you have alluded; but he has not less power of enduring fatigue, and he is a remarkably clever and sagacious little animal. He is on terms of great intimacy with all the members of my household, and seems to consider himself as a part of my family. Physically, he may be inferior to the thorough-bred horse; but otherwise I am inclined to believe that he has the advantage over him. These facts, as you will by-and-by perceive, have an important bearing on the question which you have raised.

'The indefinite perfectibility' of man is no new speculation. It was one result of that fermentation of men's minds which existed at the period of the French Revolution, when Robespierre, rejecting vulgar superstitions, marched in a triumphal procession as the high-priest of the Goddess of Reason;

> 'when busy men
> In sober conclave met, to weave a web
> Of amity, whose living threads should stretch
> Beyond the seas, and to the farthest pole;'

and when some even went so far as to believe that the time would arrive when the term of man's sojourn upon earth might be indefinitely prolonged.* The threescore years which have since elapsed have, I fear, not confirmed these expectations. That some improvement, both intellectually and morally, may take place in the course of many generations, I have already admitted. At the same time we must not lose sight of the fact that, although the mental condition of the negroes of our West Indian Islands may have been rendered somewhat superior to that of their progenitors in Africa, those of Hayti are fast relapsing into their original barbarism. Do you really believe that any people of the present day possess a greater amount of intellect than those of the little country of Attica possessed more than two thousand years ago?

Crites. Surely you must admit that the civilisation of modern Europe is of a much higher character than any which has been ever attained before; and is not this fact alone sufficient to show that my speculation may not be altogether ill-founded?

Eubulus. You may well take it for granted that those varieties or families of mankind in whom the powers of the mind are most developed are more fitted than others to enter on the career of civilisation. Still it would be a mistake to suppose that the two stand in any exact relation to each other. When New Zealand was discovered the inhabitants were but savages, little better than the poor negroes of Africa; yet, from all the accounts which we have had of them, it would appear that there is no doubt as to their greater intellectual endowments. The civilisation of the inhabitants of modern Europe has gone far beyond that of the same people during the middle ages. Their minds are more highly cultivated; but there is no reason to doubt that those of their predecessors some centuries ago were equally capable of cultivation, if the same opportunities had been offered to them. I need not repeat the reference which I have already made to that marvellous people of ancient Greece. The great agent in the promotion of civilisation is the advancement of knowledge; and if European civilisation at the present day is of a superior kind to that of Greece or Rome 2000 years ago, it is not because there is a greater amount of intellect, but because we have the advantage of the literature, art, geometry, and moral philosophy bequeathed to us by those ancient nations, with the addition of those inquiries into the phenomena and laws of nature, included under the head of the physical sciences, which the latter had neglected. The cultivation of the physical sciences has not only enabled us to obtain nobler and grander views of the universe, but, in affording us more exact information as to the reality of things around us, has been the means of dissipating many delusions and correcting many errors. This is a subject which we have in some degree discussed formerly; and I shall at present merely call your attention to the fact, that the cultivation of the physical sciences, especially within the last two centuries, has had an important bearing on other departments of knowledge, by introducing a more precise and accurate method of research. History, moral philosophy, political economy, and the science of government, have, under this influence, acquired a wholly new character, and thus in various ways has the extension of knowledge greatly contributed to improve the condition of mankind. That the intellectual capacity differs very much in the different varieties of mankind is, I suppose, sufficiently obvious; nor is this very remarkable, if we consider that it corresponds with what we observe in dogs and other animals. Experience justifies the belief that some at least of the inferior varieties of the human species—the negroes for example—are capable of a higher degree of civilisation than that which they have hitherto attained; and in our last conversation it was not denied by either Ergates or myself that, in the course of a series of generations, some actual improvement might take place in those respects in which their minds are now deficient: but I can find no facts which would lead me to believe that they would, under any circumstances, rise to the level of the more intellectual varieties, or that there is any law now in operation by which they will be so far elevated as to meet your sanguine expectations of the future.

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* See Additional Note D, page 382.

Ergates. Nevertheless, something may be urged on the other side of the question. It must be borne in mind, that, looking into the future, there is an indefinite period of time before us, during which, by however slow degrees, in a long succession of generations, great changes may be worked out. For reasons which I gave formerly, I have been led to the conclusion that the whole of the human race have sprung from the same original stock; yet how great is the difference which they present as to their intellectual capacities! How then can we venture to say that, in the revolution of ages, some new variety of man may not be produced, as superior to the European of the present day as the European is to the Australian savage?

But here another view of the subject presents itself. Whatever may be the future destiny of man, is he really so perfect that he should be regarded as the crowning-piece of the creation? We have the history of the former inhabitants of our planet, not handed down by tradition, not written in books, but recorded in indelible characters in the strata immediately below the surface of the earth. We learn from these that numerous forms of animal life existed, in ages which have long since gone by, which have now become extinct; that the first of these which were called into existence were of a simpler kind; and that by a gradual, though by no means regular progression, these have been succeeded by others of a higher and a higher order. Is man to be considered as the last of these productions? or is it not more probable that he does but stand in the middle of a long series, and that in the far distant future there may be a time when, his mission on earth having been completed, he too will be replaced by other living beings, far superior to him in all the higher qualities with which he is endowed, and holding a still more exalted place in the system of the universe? You will say that this is but a vain speculation, from which no practical good can arise, and I admit the justness of the remark. If, however, such unanswerable questions sometimes present themselves to us, it is but the result of a principle implanted in the human mind for the highest and most beneficial purposes, under the influence of which we are led on in the pursuit of knowledge, some in one direction, some in another, until we arrive at that point where knowledge terminates, and we have to substitute a more or less probable conjecture for a legitimate conclusion. Such conjectures, founded on a reasonable analogy, are not to be regarded as altogether worthless. It is for us to learn where our inquiries should end, and not to bewilder our minds by the endeavour to penetrate into regions beyond the reach of the human intellect.

It was a fine afternoon, and we walked to the railway station, accompanied by our host. As he took leave of us, he said, addressing himself especially to Crites, 'I am afraid that you have had but a dull visit. You might certainly have profited more, both as to your health and spirits, if, instead of being cooped up here, you had been breathing the pure air of a moor in the Highlands. It is probable that none of us are much wiser than we were before our conversations began. Nevertheless, I am led to hope that our time has not been altogether wasted. The subjects which we have discussed have this peculiar interest—that they belong to the incidents of every-day life, and that, such as they are, they are not above the comprehension of the humblest capacity, nor beneath the notice of the loftiest intelligence.'

ADDITIONAL NOTES.

Note A. Page 303.

The doctrine of moral insanity, as expounded by the late Dr. Prichard, has been referred to in the former part of this work. The question is one of very grave importance, as bearing on the administration of justice, and there have been not a few occasions on which the misapprehension of it has led a jury to arrive at a false conclusion. The views of Baron Alderson on the subject are so clear, and his reasoning so conclusive, that no excuse can be required for transcribing the entire passage in the charge delivered by that eminent jurist from which the brief extract in the text has been taken.

'In the first place, they must clearly understand that it was not because a man was insane that he was unpunishable; and he must say that upon this point there was generally a very grievous delusion in the minds of medical men. The only insanity which excused a man from his acts was that species of delusion which conduced to, and drove a man to commit, the act alleged against him. If, for instance, a man, being under the delusion that another man would kill him, killed that man, as he supposed, for his own protection, he would be unpunishable for such an act, because it would appear that the act was done under the delusion that he could not protect himself in any other way; and there the particular description of insanity conduced to the offence. But, on the other hand, if a man had the delusion that his head was made of glass, that was no reason why he should kill another man; and that was a wrong act, and he would be properly subjected to punishment for that act. These were the principles which ought to govern the decision of juries in such cases. They ought to have proof of a former disease of mind, a disease existing before the act was committed, and which made the person accused incapable of knowing, at the time he did the act, that it was a wrong act for him to do. This was the rule by which he should direct them to be governed. Did this unfortunate gentleman know that it was wrong to strike the Queen on the forehead? There was no doubt that he was very eccentric in his conduct, but did that eccentricity disable him from judging whether it was right or wrong to strike the Queen? Was eccentricity to excuse a man from any crime he might afterwards commit? The prisoner was proved to have been perfectly well aware of what he had done immediately afterwards; and in the interview which he had since had with one of the medical gentlemen, he admitted that he knew perfectly well what he had done, and ascribed his conduct to some momentary uncontrollable impulse. The law did not acknowledge such an impulse; if the person was aware that it was a wrong act he was about to commit, he was answerable for the consequences. A man might say that he picked a pocket from an uncontrollable impulse; and in that case the law would have an uncontrollable impulse to punish him for it.'

Note B. Page 344.

The mathematical calculation of probabilities cannot indeed be properly regarded as forming an exception to the general rule which has been laid down in the text. It is true that it does not lead to any conclusion which is absolutely certain, but the result is so far indisputable that it affords the nearest approach to certainty which, with the existing amount of knowledge, the human intellect can attain.

Note C. Page 373.

However much the advancement of civilisation may be influenced by the operation of moral causes, such as may be included under the heads of government, religion, and education, it must be admitted that it is in no less degree influenced by the operation of physical causes also. The results of the great inventions of modern times, such as the steam-engine, electric telegraph, and railways, are too obvious to be overlooked. But we must not therefore lose sight of the fact that a multitude of inventions with which we are now so familiar that they scarcely seem to attract our notice, were in their own day not less important than those which have been just referred to. To the primeval inhabitants of the earth, the rude cutting instruments manufactured from flints were a greater acquisition than the finest steel cutlery is to those of modern Europe. Nor was there any more important epoch in the history of man than that of the first domestication of the dog, whose faithful services enabled him better to contend with the wild animals of the forest, at the same time that they assisted him in procuring the necessary supply of game for his food. The first wheelbarrow contained within itself the principle of two-wheeled and four-wheeled carriages. But the greatest and most important invention of all was the application of fire to useful purposes: without it the ores of iron and copper which lie concealed in the earth could have been turned to no account; there could have been little or no agriculture, as the grains of wheat, barley, and rice are nearly wholly unfit for the food of man unless subjected to the action of heat. The same may be said of the tubers of the potato and the roots of other vegetables; and here we have presented to us what is perhaps one of the most difficult problems connected with human history. By what experience was it possible for our progenitors to learn the uses of fire, and how was it that they first ventured to employ so fierce and terrible an agent? It may well be a question, indeed, whether this knowledge was the result of experience at all, and whether it was not rather founded on an especial instinct implanted in them for the purpose.

NOTE D. Page 376.

CONDORCET, *Progrès de l'esprit humain*, chap. x.—'La perfectibilité ou la dégénération organique des races dans les végétaux, dans les animaux, peut être regardée comme une des lois générales de la Nature.

'Cette loi s'étend à l'espèce humaine, et personne ne doutera, sans doute, que les progrès dans la médecine conservatrice, l'usage d'alimens et de logemens plus sains, une manière de vivre qui développerait les forces par l'exercice, sans les détruire par des excès; qu'enfin, la destruction des deux causes les plus actives de dégradation, la misère et la trop grande richesse, ne doivent prolonger pour les hommes la durée de la vie commune, leur assurer une santé plus constante, une constitution plus robuste. On sent que les progrès de la médecine préservatrice, devenus plus efficaces pa ceux de la raison et de l'ordre social, doivent faire disparaître à la longue les maladies transmissibles ou contagieuses, et ces maladies générales qui doivent leur origine au climat, aux alimens, à la nature des travaux. Il ne serait pas difficile de prouver que cette espérance doit s'étendre à presque toutes les autres maladies, dont il est vraisemblable que l'on saura toujours reconnaître les causes éloignées. Serait-il absurde, maintenant, de supposer que ce perfectionnement de l'espèce humaine doit être regardé comme susceptible d'un progrès indéfini, qu'il doit arriver un temps où la mort ne serait plus que l'effet ou d'accidens extraordinaires ou de la destruction de plus en plus lente des forces vitales, et qu'enfin la durée de l'intervalle moyen entre la naissance et cette destruction n'a elle-même aucun terme assignable? Sans doute, l'homme ne deviendra pas immortel; mais la distance entre le moment où il commence à vivre et l'époque commune où naturellement, sans maladie, sans accident, il éprouve la difficulté d'être, ne peut-elle accroître sans cesse?

'Comme nous parlons ici d'un progrès susceptible d'être représenté avec précision par des quantités numériques ou par des lignes, c'est le moment où il convient de développer les deux sens dont le mot *indéfini* est susceptible. En effet, cette durée moyenne de la vie, qui doit augmenter sans cesse, à mesure que nous enfonçons dans l'avenir, peut recevoir des accroissemens, suivant une loi telle qu'elle approche continuellement d'une étendue illimitée, sans pouvoir l'atteindre jamais; ou bien, suivant une loi telle, que cette même durée puisse acquérir, dans l'immensité des siècles, une étendue plus grande qu'une quantité déterminée quelconque, qui lui aurait été assignée pour limite. Dans ce dernier cas, les accroissemens sont réellement indéfinis dans le sens le plus absolu, puisqu'il n'existe pas de borne en deçà de laquelle ils doivent s'arrêter. Dans le premier, ils le sont encore par rapport à nous, si nous ne pouvons fixer ce terme, qu'ils ne peuvent jamais atteindre, et dont ils doivent toujours s'approcher; surtout si, connaissant seulement qu'ils ne doivent point s'arrêter, nous ignorons même dans lequel de ces deux sens le terme d'indéfini leur doit être appliqué; et tel est précisément le terme de nos connaissances actuelles sur la perfectibilité de l'espèce humaine, tel est le sens dans lequel nous pouvons l'appeler indéfinie.'

A doctrine so agreeable to the fancy, so gratifying to human ambition, and enunciated by so eminent an individual, could not fail to attract a certain number of disciples, some of whom were even more sanguine than their master. The alchemists had failed, but the philosopher had discovered the true *elixir vitæ*. The views of Condorcet were indorsed by Godwin, in his essay on political justice; but in his case the dream seems not to have been of long duration, as, in a very few years after the publication of that remarkable work, he gave in his romance of St. Léon a graphic description of the discomforts, and even miseries, which might be expected to arise from a life protracted much beyond the usual period. The futility of such speculations, indeed, must be sufficiently apparent to anyone who bears in mind that, even under existing circumstances, the tendency of the increase of population is to overtake that of the means of subsistence, and considers to how great an extent any considerable prolongation of the period of human life must, in the course of a few generations, multiply the number of human beings on the surface of the globe.

INTRODUCTORY LECTURE

DELIVERED IN THE

THEATRE OF THE ROYAL COLLEGE OF SURGEONS IN LONDON

On the 8th of May 1820.

It is the office of that professorship, to which I have had the honour of being appointed, to explain the organisation and the functions, not of a single animal, but of the animal creation generally; to demonstrate, as far as our imperfect knowledge will enable me to do so, the laws which regulate the phenomena of life, and the changes which matter undergoes, and the forms which it assumes, when it becomes associated with this mysterious and active principle. I undertake the task which has been allotted me, with a mixed sentiment of distrust and confidence. I cannot but be aware how difficult and how extensive is the science of which I am about to treat; and I am also conscious of the imperfect nature of my own qualifications. At the same time I feel well assured of the indulgence which I shall meet with from the liberality of those who compose my audience, when they consider that the subject of Comparative Anatomy and Physiology is one which might well occupy the undivided attention of an active mind during a long series of years; and that the knowledge of it, which it can fall to my lot to possess, is no more than can be acquired by an individual who joins the pursuit of science with that of an arduous profession.

It is undoubtedly to be regretted, and it may be a matter of just surprise, that examples are so rare of persons who have devoted themselves to these curious and important researches; and that they should have been almost wholly abandoned to those whose thoughts are occupied, and whose leisure is invaded, by other avocations. It must be owned, however, that there is no class of mankind to whom this department of knowledge can present such powerful attractions as to the members of our own profession. To understand the natural organisation and the natural functions of living bodies seems to be a necessary preliminary step to the knowledge of those changes which disease induces; and to what source can we so confidently look for any essential improvements, which may be made hereafter in medicine and surgery, as to the more enlightened notions, and more comprehensive views, which may be derived from a further cultivation of anatomy and physiology? Besides, the dignity of our profession, and its rank in society, depend in a great degree on its scientific character; and those who are anxious to uphold it in the estimation of others would do well to bear in mind, that, whenever its connection with science is dissolved, it must sink to the level of meaner occupations.

Anatomy and physiology ought to be regarded as inseparable from each other. The study of the former would be uninteresting and useless if pursued alone; and that of the latter would lead only to vague and absurd opinions, were it not founded on the basis of anatomical structure. But the one is much more readily brought to a certain degree of perfection than the other. An extensive acquaintance with the organisation of living bodies can scarcely fail to be attained by diligent dissections; but when we extend our inquiries further into the functions of the parts which anatomy displays, we find ourselves engaged in a complicated and difficult investigation, in which much laborious research may be rewarded by no more than a scanty addition to our previous knowledge.

I need not inform you how little progress the ancient philosophers had made in these sciences. After the revival of letters, anatomy was cultivated with much success; physiology was enriched with the discovery of the circulation of the blood: but, with this exception, it cannot be said that any very striking improvement was made in the latter science previously to the middle of the last century, when Baron Haller and Mr. Hunter set the example of a more philosophical mode of inquiry, by referring the phenomena of life to peculiar laws, instead of explaining them, as had been done before, by the mechanical and chemical laws, which operate on dead matter.

It is true that matter, when endowed with life, does not lose those properties which belong to it in its inorganic form. The living flesh is incapable of resisting the action of intense heat, or the operation of caustics. The light is refracted by the humours of the eye, as by a lens of glass or crystal. The body gravitates to the earth. The blood flows in the vessels according to the laws of hydrostatics, and undergoes a chemical change in the lungs. But these properties are in combination with others; and the changes, which are consequent to death, show not that they are suspended, but that they are modified and counteracted by the influence of another principle.

That the laws of life ought to be regarded as different from those which govern the changes of inorganic matter, must be acknowledged by any one who considers the essential difference which exists in the nature of the two classes of phenomena. It is the office of science first to obtain a knowledge of individual facts, and, afterwards, to reduce those facts to general principles. In proportion as the generalisation is more complete, and as the number of general principles is diminished, so is science rendered more perfect. Perhaps beings of superior intelligence, and possessed of a greater range of observation, may contemplate all the immense variety of mechanical, chemical, and vital phenomena around us, as dependent on the influence of one great general law, impressed on all matter, but variously modified by the various circumstances under which it operates. But with our limited capacities we must be content with humbler views. The mechanical properties of matter must be regarded as distinct from the chemical; and neither of these, according to any right method of philosophising, can be resorted to for the purpose of explaining what is peculiar to animal, or even vegetable life.

The properties which are impressed on living matter are not only different from the properties of inorganic bodies, but they possess among themselves very different characters. The contractile power of muscles bears as little resemblance to nervous sensibility as it does to chemical attraction; and the propagation of volition from the brain to distant organs, as far as we are capable of perceiving, approaches as nearly to the force of gravity as it does to the function of secretion. Yet it is supposed that the vital properties, dissimilar as they are, have a certain connecting link; that they possess something in common; that they depend on a common principle; which we may denominate the principle of life. In this conclusion we are justified by the circumstance of our finding them uniformly connected with each other. They begin to exist, they cease to exist, at the same instant; and the same supply of scarlet blood, which imparts irritability to the muscles, is the source of sensibility in the nervous system, and maintains the various glandular secretions. The term, 'principle of life,' if used in a sober and restricted sense, expresses not an invention of the human mind, but something which has a real existence. We know it not indeed in its simple form, nor whether it be substance or quality; but we know it by the effects which it produces: in short, we have a knowledge of it similar to that which we possess of gravitation, electricity, or magnetism.

In general we see life combined with action, and living beings present an endless multitude of phenomena in perpetual and rapid succession. Life, however, may exist independent of any action which is evident to the senses. The egg continues unaltered, and giving no sign of an active principle within it for days and weeks; but its vitality is demonstrated by its resisting putrefaction; and when subjected to the influence of a higher temperature, it begins within itself a series of changes, which end in the development of a new animal. The seeds and bulbous roots of plants are under parallel circumstances, and trees are frost-bound in the winter, and put forth new leaves and blossoms in the ensuing spring. A leech, which was immersed in a cold mixture, was instantly frozen into a hard solid substance; at the end of a few minutes the animal was gradually thawed; the leech revived, and continued to live for thirty-six hours after the experiment. A curious illustration of this subject is afforded by the animalcules which occasion the blight in corn, called by farmers the *purples*, or *ear-cockle*. These animalcules, which are not to be discerned by the naked eye, become distinctly visible when moistened with a little water, and placed on a piece of glass in the field of a microscope. They are seen in constant motion, and even the ova may be detected in the act of escaping from the oviduct. If the moisture be allowed to evaporate, a dry stain is left on the glass, which is scarcely perceptible; but on the addition of a little water, the animalcules revive and move briskly as before. This experiment was repeated by Mr. Baüer with the same animalcules at intervals of several months, during a period of more than six years, and always presented the same phenomena.

One of the most remarkable circumstances belonging to life in its active state is, that there is a perpetual change of the materials of which animate beings are composed. The old particles separate themselves in the form of the urine, the perspiration, and the various other excretions; and to supply this waste there is a constant influx of new particles from without. Dead inorganic matter becomes endowed with life, and forms a part of the substance of the living body, from which, after a certain period, becoming again detached, it returns to be blended once more with the external world, and to obey those laws to which it was originally subjected.

The supply of new materials which is required, and the waste of old materials which takes place, varies very much, according to the state and nature of the animal. Where the vital functions are in a state of great activity, there is a demand for a larger and more frequent supply of nourishment, than under the opposite circumstances. The man who leads a life of indolence and repose requires a smaller portion of food than one whose habits are those of great bodily exertion. Many animals sleep through the winter months without any nourishment whatever; and in the Philosophical Transactions there is an account of snails, which remained in a cabinet during several years without leaving their shells, and were still alive at the end of that period.

It appears that only particular forms of matter are capable of being endowed with life. Water enters largely into the composition of all living bodies. The number of other elements is not more than three or four in the vegetable, and seven or eight in the animal kingdom. In both, carbon predominates; but in the latter there is a large proportion of nitrogen or azote, which for the most part does not exist in vegetables. The elements of which I have spoken are variously combined and compose numerous and dissimilar textures. They undergo chemical changes under the influence of the living principle, many of which are such as are never observed to take place under other circumstances. It seems as if some of those which we have been accustomed to regard as simple substances, and as possessing nothing in common, when exposed to the action of the living organs, are capable of assuming new characters and of being transformed into each other. The corn and hay on which a horse is fed afford only a minute trace of phosphorus, yet phosphorus is found in abundance in the horse's urine and in the earthy part of his bones. The egg contains a yolk floating in a transparent fluid; the latter is pure albumen; the former is albumen with a small proportion of oily matter; and in neither of them can lime or phosphorus be detected. Exposure to a certain degree of heat is sufficient from these simple materials to form not only the complex structure of brain and muscles, and mucous and serous membranes, but even a skeleton of bones and cartilages, which derive their solidity and firmness entirely from the phosphate of lime belonging to them.

In all animals there is a fluid, the blood, which the vital powers keep in a state of constant motion, and which seems to hold an intermediate state between the dead matter of the external world and the substance of the living body. The sap in vegetables may be considered as corresponding to the blood in animals. Into this fluid the matter which is to be added to the system is first poured, and that of which the vitality is exhausted also makes a part of it previously to being separated by means of the various excretions. The blood is necessary to life, inasmuch as it supplies to the different organs that without which life cannot exist, but no further. A frog will crawl and display every mark of sensibility for an hour after the excision of the heart, and consequently after the vessels have become empty of blood. The head of a turtle was still alive, and bit at objects which were presented to it, many hours after it had been separated from the trunk. Numerous examples similar to these are furnished by the inferior animals; and even among the higher orders we find that young animals retain their faculties for several minutes after the circulation has ceased.

Life, in its active state, exists no where except where there is access to the atmospheric air. Fish and various mollusca inhabit the bottom of the ocean, but their life is maintained by the air which is dissolved in the water. The influence of the atmospheric air is even more important, and more directly necessary to animals, than a regular supply of nourishment. But what is the nature of that influence, and in what manner does it operate? This is a difficult subject of experiment; but from the most accurate observations which have been made, it appears that the air acts only on the circulating blood, and that the chemical changes which take place in the various orders of animals are the following: a certain portion of oxygen gas disappears, and in its place is found an equal volume of carbonic acid. A cubic inch of carbonic acid may be resolved into a cubic inch of oxygen gas united to a certain quantity of carbon. We may, therefore, conclude that on exposure of the blood to the air carbon is evolved, and that no material or ponderable substance is absorbed. In red-blooded animals the blood, which was before of a dark red colour, becomes of a bright scarlet. Here the observations of the chemist terminate: but the physiologist ascertains that the dark-coloured blood is incapable of maintaining the vital functions: while, on the other hand, wherever the scarlet blood is distributed, the powers of life, in proportion as they are exhausted by exercise, are renewed, and the functions continue to be regularly performed. It is evident that the blood in respiration acquires something of the first importance in the animal economy, and which it had not before. The effects produced by the contact of the air are not confined to the mere separation of carbon; but in order to determine the precise nature of these effects, we require more extended observations and a deeper insight into the nature and causes of vitality than it will probably ever fall to the lot of man to possess.

Living beings have not an insulated existence. They have various relations to external objects which act on them in different ways, and on which they operate in return. Besides what are common to them and inorganic matter, there are other relations connected with their vital principle and peculiar to themselves. Two of the most important of these have been already noticed in treating of nutrition and respiration; but there is an endless variety of others too numerous to mention. From the lowest to the highest in the scale of animation we observe impressions from without exciting certain changes within, and giving rise to new actions and new phenomena. The dionæa muscipula contracts its leaves and encloses the insect by which it is irritated. The convolvulus opens its flowers to the warmth of day, and shuts them to the cold and damp of evening. Animals are not only more susceptible of impressions than plants, but there is superadded to their organic structure that which feels and wills and reasons; and the impressions made on them excite sensations, which we suppose to be wanting in the vegetable kingdom. I cannot accord with those who consider the inferior animals to be without sensation, because we are unable to discover in their anatomy any distinct organ adapted to the exercise of this function; at the same time we must acknowledge it to be probable that in them sensation is obscure, and that there is only an imperfect consciousness of existence. In the higher orders sensibility is more exalted, and consciousness is complete. In them there are particular structures admirably adapted to receive impressions from other bodies, and to convey the impressions which they make to that principle in which the intellectual and moral faculties reside.

Even in animals, however, it is not every impression which operates on the vital functions that has a corresponding sensation. There are many which would pass altogether unnoticed, were it not for the other effects which they produce. The presence of food in the stomach excites the secretion of gastric juice and motions of that organ, of which we are altogether unconscious. The application of the extract of belladonna to the eyebrow causes a dilatation of the pupil of the eye, yet we have no perception of its action. A young woman received a blow on her head, by which she was stunned for a few minutes; after she recovered from the immediate effects of the accident, she found herself entirely deprived of the senses of smell and taste; and she was in this state when I saw her a month afterwards. The strongest and most pungent odours produced not the slightest sensation when applied to the nostrils; but they nevertheless increased the secretion of the lacrymal glands, or, in common language, made the eyes water, as under ordinary circumstances.

Among the most obvious, though not the least remarkable, properties with which living beings are endowed, is that of being capable, within certain limits, of resisting the influence of the external heat and cold, and of maintaining a different and peculiar temperature. In the midst of a long-continued frost, a thermometer introduced into the centre of the trunk of a tree does not sink to the freezing point. The temperature of the interior of a tree is said to be above that of the atmosphere, if the latter be below 57 of Fahrenheit's thermometer; and if the temperature of the atmosphere rise above this point, that of the tree does not rise in the same proportion. In experiments made by

Mr. Hunter, he found that when the bulb of a thermometer was introduced into the stomach of a carp, the mercury rose to 69 degrees, although the temperature of the pond in which the fish swam was no more than 65½. When the temperature of the air was 58, that of a viper's stomach was 10 degrees higher; and when a viper was placed in a temperature of 108, the heat of the stomach rose no higher than 92½. If the bulb of a thermometer be placed under the human tongue, the mercury rises to 99; and this is equally the case in the heat of summer and in the cold of winter. It is perhaps natural that an explanation of these and similar phenomena should have been sought for among the numerous causes by which heat is produced in inorganic substances, and hence they have been attributed by the mechanical philosophers to the motion of the fluids, and to the friction of the particles of matter on each other; and by the chemists, to the consumption and decomposition of oxygen gas in the act of respiration. But there are many circumstances which seem to be in contradiction to such hypotheses, and which render it questionable whether the maintenance of the vital temperature does not depend on some process peculiar to life, and whether it is not to be referred to the same source with secretion and the other vital functions.

Throughout every part of nature we find not only that the component parts of living bodies require to be constantly renewed, but that the individuals themselves are constructed so as to enjoy existence during only a limited period of time. On every side we see them return to the condition of dead matter, exhausted by old age, or destroyed prematurely from accidental causes. The mysterious function of generation supplies the new individuals which are to take the place of those which have perished, and by means of which the continuance of the species is effected. But does animation ever begin to exist where it did not exist before? Is there any process, independent of generation, by which inorganic matter can of itself become endowed with the living principle? In the interior of the earth we find the bones and shells of innumerable races of animals which have long ceased to exist. It is reasonable to conclude that, whatever has an end must have had a beginning; yet with respect to the higher orders, both of animals and vegetables, it is beyond a doubt that the ordinary laws of nature are insufficient for the production of a new species, and the observations of the physiologist tend to confirm the doctrine of a particular creation. With respect to the origin of those which are lower in the scale of animation, there is not, perhaps, the same degree of certainty. Hydatids are met with in the mesentery of the sheep, and flukes in the biliary vessels. Worms live in the intestines of various animals, and have been found even in those of a fœtus. In an ass or horse, which has attained a certain age, there are usually small animals resembling ascarides in external form in a dilatation of one of the mesenteric arteries. It is difficult to understand in what manner the ova of these parasitic animals can be conveyed into the places which they inhabit, or from whence the ova can be derived, since these animals are for the most part of a peculiar kind, bearing no resemblance to any of those which exist in other situations, nor even to each other. The hydatids of the sheep's mesentery are entirely different from the flukes of the biliary ducts, and the structure of the intestinal is not the same with that of the arterial worms. Every one is acquainted with the minute eels which are found in turbid vinegar. If any vegetable or animal infusion, after remaining for a few days at rest, be examined with a microscope, it is found full of animalcula of singular and various forms, possessing the power of locomotion and exhibiting other characters of life; and Mr. Needham found that these creatures showed themselves equally under all circumstances, so that, in his latter experiments, he became indifferent whether he adopted or neglected those precautions which he at first supposed to be requisite for their production.

Facts, such as have been enumerated, may almost induce us to believe that there is in nature the power of forming the lower orders of living beings by an equivocal generation, and that dead matter is, under certain circumstances, capable of bursting into life where life did not before exist. The following arguments may be urged on the opposite side. These same animals, when once called into existence, are endowed with the generative faculty, and bring forth young in the usual manner. Is it probable that the origin of the parents should be different from that of their offspring? Is it not more reasonable to conclude that something respecting the production of these minute creatures is concealed from our view, than that they should be produced in a manner entirely contrary to the analogy of what is observed in other beings endowed with life, whose larger size makes them more fit subjects of observation? It is not difficult to believe that their ova may be too small and insignificant to be cognisable by our senses; that they exist where their existence is not suspected; and that it is only when conveyed by accidental circumstances into a proper nidus, that they give birth to the young animals. The circumstances which have been already mentioned respecting the microscopic animalcules, which occasion one species of blight in corn, show for what a length of time the living principle may remain in a dormant state, and render the last supposition highly probable.

There is no example of a being possessed of life, even in its simplest form, which is produced in its perfect state, and which has precisely the same structure and the same functions in the early as in the advanced stages of its existence. Both plants and animals contain within themselves the principles of their own growth, and of their own decay and dissolution. Compare the young oak, just bursting from the acorn, with the tree, which, after the lapse of centuries, is seen with a hollowed trunk and withered branches, scarcely capable of bringing forth in the spring an imperfect foliage. Compare the infant child with the old man; or the caterpillar, which has just quitted its shell, with the chrysalis or butterfly. A series of constant but minute and gradual changes works these strange conversions, and maintains the identity of what might otherwise be regarded as wholly different creatures. The condition of the individual is never stationary; but his progress is not uniform; and for the most part the changes which constitute his formation and growth, succeed each other more rapidly than those which mark his approach to the termination of existence. These changes, however, striking as they are, are more limited than on the first view they appear to be. The vital powers may undergo various modifications, but essentially they are the same in the fœtus as in the adult man. The different organs may become developed, and may be called into action, at different periods; but no new organs are formed, and the rudiments of those which exist in mature age may be traced in the young animal or vegetable, as soon as it has acquired sufficient magnitude to admit of anatomical examination. The wings of the butterfly are enclosed within the integuments of the caterpillar; the lungs of the frog may be discovered in the tadpole; the testes of the man in the human fœtus. The bulbous root of the tulip contains the miniature flower and leaves of the ensuing year, completely formed; and it is said, that the future plant, perfect in all its parts, may be discovered in the germs of the mezereon. The organs and functions first developed are those which relate to the preservation of the individual; or, to use the expression of a modern physiologist, which belong to organic life. The next in order are those which belong to animal life, by means of which the individual maintains his relations to external objects; and the last are those connected with generation and the preservation of the species. The order in which these functions decay is the reverse of that in which they are developed; and before we die we may be said, in a physiological as well as in a popular sense, to enter into a second childhood; since the only functions which continue to be performed up to the period of the extinction of our corporeal frame are those which are the first to display themselves in the infant.

There is nothing in the history of animals more worthy of notice than these changes, which are always taking place, but which are most remarkable at particular periods of their existence.

That a tree should blossom in the spring; that its fruit should reach maturity in the autumnal months; that its foliage should wither and die at the approach of winter; these things may be the result of obvious causes; and the artificial summer of a hot-house will produce the vegetation of July amid the snows of January. But the same explanation does not apply to what occurs in the higher classes of organic beings; neither does the decay and dissolution of the latter bear any actual analogy to the gradual destruction of those machines which are the result of human invention: and we in vain inquire, what is that mysterious agency which renders the human fœtus incapable of maintaining fœtal life after the lapse of forty weeks; which afterwards produces the phenomena of puberty; which, at a still later period, occasions the ossification of the arteries, and the diminution of the size and number of the capillary vessels; which limits the life of the silkworm to a single season, while that of the whale is extended to several centuries?

While, however, we contemplate these changes of properties and structure, in which every organ more or less partakes, we can scarcely fail to believe that an animal is something more than a mere assemblage of instruments, which are connected, and act in concert, with each other. We seem to have a glimpse of some one principle common to the whole system, which gives it a real individuality, and which operates on its different parts, so that they keep pace with each other in their progress towards perfection and in their subsequent decay.

I have already observed, that as the mechanical philosopher explains the mechanical changes of the material world, by ascribing them to attraction, repulsion, or elasticity, so the phenomena of life enable the physiologist to ascertain the existence of certain vital properties, to which may be referred the various changes which take place in, and are peculiar to, living bodies. The principal of these are irritability and sensibility. By irritability we mean that species of contractility which is peculiar to life, and which exists in the greatest degree, but not exclusively, in the fibrous structure of the muscles. The term sensibility has been used by some modern physiologists to designate the capability of receiving, and of being acted on by, impressions; whether this be or be not attended with sensation and consciousness. The existence of sensibility is most evident in combination with a distinct nervous system; at the same time it must be observed, that it exists where nerves cannot be detected, as in plants, and even in some of the inferior animals. These two properties, irritability and sensibility, go far towards explaining the phenomena of life; and many physiologists seem to suppose that the whole of them may be traced to one or other of these sources. It does not, however, require much consideration to convince us, that this cannot be regarded as a correct opinion. Glandular secretion, exhalation, and that deposition of new matter which constitutes growth and nutrition, cannot, except by a forced and hypothetical reasoning, be referred to either of the vital properties, which have been just mentioned. The blood in the living body, under natural circumstances, has no tendency to separate into its solid and fluid parts; but neither the same quantity of motion, nor the same temperature, nor the same exposure to oxygen, nor all of these combined, will prevent the coagulation of blood which has been drawn from the vessels. The gall-bladder, during life, does not allow the smallest particle of bile to transude through its coats; but, in a short time after death, while the organisation is yet unimpaired, the bile escapes in sufficient quantity to tinge all the neighbouring viscera. There is an association of animal actions, corresponding to the association of ideas, feelings, and emotions, and which is the foundation of corporeal, as the latter is of mental habit. Do these things admit of any reasonable explanation by means of sensibility and irritability? Do they not rather demonstrate, that our catalogue of the vital properties is not yet complete, and that we may expect it to become more ample, in proportion as, by a patient investigation of facts, and careful induction, we are enabled to render physiological science more perfect?

It has been stated, that only particular forms of matter seem to be capable of being endowed with life. The principal of these in animals are carbon, hydrogen, oxygen, and azote: and these are found united in various proportions, forming three elementary substances, which are the basis of all the great variety of animal textures. Chemists have distinguished two of these by the appellations of gelatine and albumen, of the latter of which fibrine may be regarded as a modification; and the third is the pulp of the brain and nervous system. If to these elements are added phosphate of lime, the animal oils, and a few other compounds, which exist in smaller proportions, we have a view of the whole of the constituent parts of the animal machine. It is curious to observe how greatly the functions of organs vary, which possess nearly the same chemical composition. The glandular structure of the kidneys and liver, the articular cartilages, and cuticle, are all modifications of albumen. The cutis, a membrane of complex structure and of complex functions, and the simple exhaling membrane of the peritonæum, are almost wholly composed of gelatine. The principal chemical difference between the contractile fibre of a muscle and the inert fibre of a tendon is, that the former contains a smaller proportion of oxygen, and a larger proportion of azote. The cerebral pulp, the centre of sensation and the source of volition, is said by Fourcroy to differ from the albumen, of which glands and many other organs are composed, in little else than in being more highly organised and in the want of fixed alkali. Considering these circumstances, we find it no matter for surprise that the remarkable improvements in animal chemistry, which have been made of late years, should not have been attended with a proportionate advancement of the kindred science of physiology. Let us not, however, underrate the value of the former of these sciences. Whatever tends to give us more accurate notions of the composition of living bodies, cannot, at any rate, be devoid of interest; and it is not improbable that many of those distinctions, as to the nature of animal substances, of which we are unable at present to perceive the utility, may ultimately prove to be of real importance. Without the aid of the chemist, the physiologist would in vain have laboured to understand one of the principal functions of the animal economy—respiration. Little as we know of those wonderful processes of nutrition and excretion, by means of which new materials are constantly added to our system, and the old materials are separated from it; we should have known still less had we not possessed the light which animal chemistry has shed on these subjects, and it is to the same source that we are principally to look for their further elucidation.

Although different organs present so little variety with respect to chemical composition, they differ exceedingly as to their mechanical properties and texture; and, in the present state of our knowledge, it is certainly of more importance to the physiologist to possess an accurate acquaintance with the latter than with the former. Parts, which execute dissimilar functions, are always dissimilar in their organisation. The brain bears no resemblance to the muscular fibre; and there is no analogy between the fabric of the latter and that of the glands or investing membranes. Even where there are slight shades of difference in the functions, there are corresponding shades of difference in the structure. The nerves which belong to the involuntary muscles are differently constituted from those which transmit the influence of volition. The skin at the extremities of the fingers is endowed with a nicer sense of touch than the skin in other situations, and, accordingly, the anatomist discovers in it a more refined and complex organisation.

Everything relating to this subject tends to prove, that the peculiar functions of a living organ are intimately connected with the peculiarities of its anatomical structure. This leads us to one of the most abstruse and difficult questions connected with physiological science. Are we to conclude that the phenomena of life are dependent solely on organisation? that a certain mechanical arrangement of particles is in itself a sufficient cause for muscular contractility, or for nervous sensibility? Immediately after a muscle is separated from the rest of the system, by means of a piece of zinc and silver, properly disposed, it may be excited to powerful contractions. Wait for a few minutes, and it is no more capable of contraction than the tendon which is annexed to it: yet, after this, a certain interval of time elapses before the organisation begins to be destroyed by putrefaction. The substance of the living animal is impermeable to the various animal fluids. Let life be extinguished, and we find the bile, the urine, the aqueous humour of the eye, the blood itself, readily penetrating the membranous tunics in which it was enclosed, before we can detect the most trifling alteration in their texture. These, and other things of a similar nature, do not seem to be well explicable, except on the hypothesis of there being in living bodies something superadded to organisation, without which they would be as incapable of executing their functions as the pendulum of a clock would be of vibrating, or its wheels of revolving, if they were deprived of the spring or weight, in which the cause of their motion resides.

Not only do different organs differ from each other in their anatomical structure, but the same organ is found to consist of dissimilar parts, and the whole of the animal system may be resolved into certain elementary textures, possessing various organisations, and connected with each other in various ways. A knowledge of these elementary textures is of the first importance in anatomical and physiological, as well as in pathological science. At the same time it must be owned that there are many obstacles in the way of an accurate analysis and a perfect arrangement; and, perhaps, it is impossible to give such an account of them as may not be open to some objections. Certain parts are composed of fibres, while others are of a membranous structure; and this is the most obvious distinction which we are led to make, at least in man, and in the animals which approach him in their nature. But animal fibres are of various kinds, which differ essentially from each other, and seem to possess only a superficial resemblance in the mechanical arrangement of the particles of matter which compose them. We distinguish fleshy fibres, which possess the property of muscular contractility; the white medullary fibres of the brain, nerves, and spinal marrow, which are concerned in the transmission of sensation and volition; and the unyielding inert fibres, which compose the tendons, ligaments, and fasciæ. The cellular membrane is composed of thin transparent flexible lamellæ, united in such a manner as to leave intermediate spaces or cells, which communicate extensively with each other; and this texture and its modifications seem to constitute the basis of several, if not of the majority, of the other membranes of the body: besides which, in some parts, its cells are filled with oily matter, and form the adipose substance. If to these we add the cuticle and its appendages; the substance of the glands; the bones and cartilages; and the elastic matter, which is found in certain situations; we have enumerated, at any rate, the principal component parts of our system.—Bichat, who first undertook the task of making a scientific classification of the elementary textures of the animal system, has indeed furnished us with a longer catalogue. But it is evident, that this ingenious and philosophical anatomist has considered some as distinct from each other, which are so closely allied, that they may be regarded as the same; and has considered others as simple, which are in reality compound. If the chemist is at a loss to determine on the nature of the elements to which unorganised bodies may be reduced, and finds their number become diminished in proportion as he extends his researches further, we need not wonder that similar difficulties should present themselves in the more complex and abstruse science of living beings; and these difficulties demonstrate only the imperfection of our knowledge, and not that the attempt at anatomical analysis is ill founded.

It is scarcely more easy to make a satisfactory classification of the animal functions, than it is of animal structures. Bichat has distributed the former into three orders: 1st. Those which relate to the individual himself, which are common to all organised and living beings, plants as well as animals, and which he therefore terms functions of organic life: 2ndly. Those, by means of which a living being maintains his relations to the external world, and to which, as he considers them peculiar to animals, he applies the name of functions of animal life: 3rdly. The generative functions which belong to the reproduction of the species. But these functions are so blended with each other, that we are compelled to acknowledge that this arrangement is entirely theoretical, and that it is not one which is likely to be practically useful, or to lead to any essential improvement in the science of physiology. The heart, which is to be regarded as the principal organ of organic life, is not more necessary to the functions of one order, than it is to those of the other. The brain, which is described as the centre of animal life, has under its influence respiration, digestion, and various secretions, which belong to organic life. Such is the mutual dependence of the organs on each other, that the animal system may be said to form a circle; and in giving a history of its functions, we may with almost equal propriety begin with any one of them. We cannot, as in some sciences, set out with what is most simple, and gradually ascend to what is complicated. In considering one set of phenomena, I shall often have occasion to refer to others, which I have not had an opportunity of explaining, and I shall feel it difficult to say all that I could wish to say on these subjects, without supposing my audience to be already possessed of a general information respecting them. This I am anxious to state in the commencement of the course, as an apology for many things in the subsequent parts of it, which might otherwise be attributed to a want of method, and a careless arrangement.

But perhaps such an apology may be regarded as unnecessary. As the greater part of this theatre is allotted to the members of the College, and as few are admitted into it who have not made some progress in anatomical studies, it is evident that the Board of Curators do not expect that these Lectures should be regarded as purely elementary. It is the duty of the Professor to adapt his observations as much as possible to the nature of his audience; and I conceive, that in this place I am bound to believe, that those around me have at least a general acquaintance with the structure of the human body, and a general knowledge of the different animal functions. I know also that there are many individuals, who have entered deeply into these investigations; and of them I have to request, that they will keep in their recollection, that I do not undertake to promulgate discoveries, but only to make a selection of such facts as seem to be most striking, and best calculated to illustrate the general principles of anatomical and physiological science.

If, in this introductory discourse, I say but little of the great philosopher who founded the Museum of this College, and to illustrate whose labours is one of the objects for which these lectures are designed, let it not therefore be imagined, that I can otherwise than justly estimate the magnitude of his exertions and the splendour of his achievements. The written works, which he has bequeathed to us, give but an inadequate notion of his powers; and whoever would rightly scan his character must study this anatomical collection, where the multitude of facts, which are recorded, show the extent and minuteness of his researches; and the beautiful arrangement which he has made of organs and functions, demonstrates how admirably his mind was adapted for accurate analysis and philosophical induction. To understand, however, all the obligations which we owe to Mr. Hunter, we must consider what was the condition in which he found these sciences, and in what condition he left them. By his single efforts, amid the occupations and anxieties of an active professional career, he has done as much for us as has been done at a later period for a neighbouring country, by the successive labours of Bichat and Cuvier. Since the time when Mr. Hunter gave a new direction to men's minds on these subjects, the clumsy mechanical and chemical notions of former ages have vanished; physiology has attained the rank, which it deserves to hold, amongst the highest departments of human knowledge; and surgery has risen from the place of a manual art to that of a liberal and enlightened profession.

From the contemplation of the present, the mind naturally passes to that of the future; and surely I cannot be accused of indulging in an idle reverie, if I anticipate great results from the energy and zeal with which all those sciences are now cultivated, that are in any way connected with our pursuits. Such is the present spirit of emulation, and so rapid is the march of knowledge, that whoever contents himself with the stock of information which he has already acquired, must soon find himself outstripped by his competitors. The practical pathology of these days bears no more resemblance to the hypothetical doctrines which once prevailed in the schools, than the astronomy of Newton does to the visions of Des Cartes. Founded on a more solid basis—composed of more durable materials, the fabric of modern pathology already assumes the appearance of a regular and substantial structure. Let those who labour to complete the important work, be assured that they can be fitted for the task which they have undertaken, only by having previously acquired correct notions of the organisation of living bodies, and the laws of vitality. Let them bear in mind how much of the genius of Boerhaave, and Brown, and Cullen, has been lost to the world, because they attempted to explain the principles of disease, without having first rightly comprehended the natural state of the animal economy.

ON THE

EFFECTS OF STRANGULATION.*

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THE subject which I have chosen for the present lecture is of much interest, inasmuch as it involves the consideration of some important questions in physiology. It also possesses a strong claim on your attention as practitioners. If you are called to a person who is in danger of perishing from strangulation, you have no time to go home and consult your books, or ask the opinion of your friends; the case is pressing; if anything can be done it must be done at once, and it is not sufficient for you to know the treatment which *may be* useful, you must also know where it is worth while to have recourse to it, and to distinguish from each other those cases in which some grounds of hope exist, and those which are actually hopeless. Nor is this all; on these occasions you are liable to be called upon to give evidence in a court of justice, and you will cut but a sorry figure before a judge and jury, unless you have an adequate knowledge, not only of the surgical treatment, but also of the physiology, of strangulation.

It is evident that the effects of strangulation produced by a cord drawn tight round the neck must be more or less complicated:—1. It has been said that one of these effects is an injury of the cervical portion of the spine, and that there may be even dislocation of the odontoid process of the second vertebra; 2. There is always pressure on the blood-vessels; 3. There cannot be pressure on the vessels without pressure on the nerves also; and, 4. There is pressure on, and obstruction of, the trachea.

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* This and the following lecture formed part of a course delivered in the Theatre of the Royal College of Surgeons of London as long ago as the year 1821. The lectures themselves are now published for the first time. Much of what they contain, however, may be found in the useful and comprehensive work on Medical Jurisprudence by Dr. Paris and Mr. Fonblanque, taken from the notes which I communicated to Dr. Paris.—B.C.B., 1846.

Which of these is the cause of death?

1. With respect to the one first mentioned, I may observe, that I have examined the bodies of several persons who had been hanged, and never found the spine to have been injured in a single instance. It is certainly a rare occurrence. Louis, however, mentions that he had examined the necks of criminals who had been hanged by two different executioners, and that he ascertained that in those who had been executed by one of them there was a luxation of the first vertebra from the second, while it was not so in those who had been executed by the other.

2. I have seen the inner tunic of the carotid arteries lacerated by the pressure of the cord. This appearance, however, does not (as I believe) present itself in the majority of cases. It is manifest, that the pressure must always operate on the jugular veins so as to interfere with the due return of blood to the heart, and cause an accumulation of it in the vessels of the brain. In examining the body of one person who had been hanged, I found a large extravasation of blood in the substance of the cerebrum; and in Dr. Hooper's valuable museum of pathological anatomy there is the brain of another person who had died in the same manner, with a considerable extravasation of blood among the membranes. These are, however, undoubtedly, exceptions to the general rule. Neither vascular congestion, nor sanguineous apoplexy, is the common cause of death from strangulation. I passed a ligature under the trachea of a guinea pig; and having drawn it as tight as possible, I secured it with a knot at the back of the neck; so that it included all the parts situated in the neck, with the exception of the trachea. The animal seemed uneasy, but breathed and moved about, and continued to do so after the ligature was removed at the end of a quarter of an hour from the period of its application.

If the ligature were to make such pressure on the arteries which supply the brain as to prevent altogether the influx of blood into it, it is to be presumed that immediate death would be the consequence; but the fact is that the vertebral arteries are out of the reach of pressure, and maintain the circulation notwithstanding the obstruction of the carotid.*

3. It is not to be supposed that the pressure of the cord on the nerves of the neck can be the immediate cause of death, as the most important of these nerves (the pneumogastric) may be completely divided, and yet the animal may survive the injury for a considerable time. It is not, however, very improbable, that if an individual were to recover from the first effects of strangulation, he might suffer from the injury done to the nerves afterwards. The animal which was the subject of the experiment which has been just related died on the following day. On dissection, I could discover nothing unusual in the brain; but the lungs were dark-coloured, and turgid with blood, presenting an appearance a good deal similar to what I have observed in animals who have died after the division of the pneumogastric nerves. That a temporary pressure on a nerve should leave the functions of the nerve impaired for a certain period is no more than what happens in many other cases; for example:—A gentleman met with an accident which caused a dislocation of the shoulder. The dislocation, as I was informed, was not easily reduced. the patient being for a considerable time under the operation. The extending force had been applied above the elbow, and when I saw the patient, two or three days afterwards, the forearm and hand were benumbed, and the muscles were paralytic, and several weeks elapsed before these symptoms were completely removed.

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* The remark is sufficiently obvious; but it may be worth while to notice the confirmation of it by an interesting experiment of Sir Astley Cooper. Sir Astley found that the vertebral and carotid arteries of a rabbit, near their origin, are so situated that it is easy to make pressure on them at the same time. The result of such pressure is, that the animal appears to die instantaneously. But the heart continues to act, and by immediately having recourse to artificial respiration he is restored to life, as after strangulation.

4. There can be no doubt that strangulation causes death by closing the trachea, and preventing respiration; and that whatever other effects it produces are of secondary importance to this.

Dr. Munro hanged a dog, having previously made an opening in the trachea below the part at which the ligature was applied; the animal was kept in this state for an hour, and lived afterwards.

If an animal be hanged, and, as soon as he becomes insensible, an opening be made in the trachea below the ligature, he begins to breathe, and his sensibility is restored.

A ligature which includes the trachea, and nothing else, produces death exactly in the same manner as if the entire neck had been included in it.

It is needless to adduce further evidence on the subject. The mode of death from strangulation or hanging is sufficiently obvious. 1. The trachea is obstructed, so that air cannot enter the lungs. 2. The blood passing through the lungs does not undergo that change which respiration produces, and which is necessary to life. 3. Dark-coloured blood, which has not been purified by exposure to air, is transmitted to the left side of the heart, and from thence to the brain and other organs. 4. The heart continues to act, circulating dark-coloured blood, but its actions gradually become weaker, and, in the course of a very few minutes, cease altogether.*

But here the question arises, what is the immediate cause of the cessation of the heart's action? The circulation of the blood continues only for a certain period after respiration has become suspended: why is that period limited?

Some explanations of this fact have been offered formerly, which will not be accepted in the present more advanced state of physiological science. Especially, it has been said that the motions of the lungs connected with the alternate admission and expulsion of air were somehow necessary to the motion of the heart. Now, it is quite true that whatever, by enlarging the dimensions of the chest, tends to draw air into the lungs, must also tend to draw blood into the heart, and so far it may be supposed that the action of the diaphragm and intercostal muscles may contribute in a small degree to the maintenance of the circulation. The temporary relief which a deep sigh affords under certain circumstances may probably be thus explained. However that may be, an experiment made long ago by Dr. Hook is sufficient to establish the fact that the powerful muscle of the heart does not in reality require any such external aid for the due performance of its ordinary functions. This distinguished philosopher having laid open the thorax of a dog so as to expose the heart and lungs, and having applied the nozzle of a pair of double bellows to the trachea, made a great number of punctures in the pleura on the surface of the lungs. The air-cells being thus exposed, by means of the double bellows, he maintained a constant stream of air through the lungs, that which entered by the trachea finding its way out by the superficial air-cells. Thus respiration was kept up while the lungs were perfectly quiescent. The result was, that the heart continued to act vigorously as long as the current of air through the lungs was uninterrupted. When the use of the bellows was suspended, its actions became more feeble; when it was resumed, they regained their strength.

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* It appears that in some instances of those who are hanged *as criminals* other injuries are inflicted besides those which have been enumerated. Dr. Hunter, in two individuals whom he examined, found extensive contusions and lacerations of the muscles, and the arytenoid and thyroid cartilages separated from each other. (*See Pathological Observations by Dr. Hunter, in the Dublin Hospital Reports.*) These complications may be attributed to the greater violence exercised in this mode of hanging, compared with that in persons who have attempted suicide.

Another hypothesis has been, that the heart is made to contract by the blood in its cavities acting as a stimulus to its muscular fibres: but that this property is confined to the scarlet blood, which has just received the vivifying influence of oxygen, and of which there is, of course, no supply after the obstruction of respiration. But the right ventricle, which, under no circumstances, contains anything but dark-coloured venous blood, contracts, as well as the left. If it be said that the two ventricles are intimately connected with each other, that they contract simultaneously, and that the scarlet blood in the left ventricle acts as a stimulus to the muscular fibres of the right ventricle also, it may be answered, that it is quite true that in the human subject the connection of the two ventricles is intimate enough, but that it is not so in all animals. In the dugong, for example, they are quite separate and distinct; and in the whole race of fish there is only a single heart, which, receiving the blood from the general system, and transmitting it to the organs of respiration, of course contains only that which is dark-coloured.

Under the influence of higher views in physiology, Bichat has furnished us with another solution of the connection which exists between the functions of the lungs and those of the heart. The florid scarlet blood is necessary to the generation of muscular irritability. In a suffocated animal the dark-coloured blood penetrates the muscular structure of the heart by the coronary, as it does the rest of the system by the other arteries; and the irritability of the heart, when it is once exhausted, is not renewed in the usual manner. But there is more than this. In the free discussion of received opinions, without which no advances can be made in science, we are led to inquire whether the doctrine of Haller, that the contractions of the heart are produced by the contact of the blood in its cavities, be really well founded? It seems to me that there is abundant evidence to the contrary. Let an opening be made into one or all of the great vessels near the heart — the veins that take the blood in, or the arteries that carry it out;—the cavities are then almost instantaneously emptied of blood; but the contractions of the heart continue nevertheless; at first regular, frequent, and vigorous, then gradually becoming less so, until they cease altogether; and the motions of the heart, under these circumstances, without any blood in it, last as nearly as can be for the same time as those of the heart distended with blood after strangulation. But if the blood be not the stimulus, to what can we attribute the contractions of the heart, unless it be the influence of the nervous system? And is not this a much more reasonable hypothesis than the other, more conformable to analogy, and offering a better explanation of the phenomena which occur both in health and in disease? The supply of scarlet blood is not less necessary to the production of nervous energy than it is to that of muscular irritability. The diaphragm is stimulated to contract in respiration, not by the air in the lungs, but by impressions which it receives through the phrenic nerves. So it is with the muscles which are concerned in the acts of coughing, sneezing, vomiting. In a case of extra-uterine conception, the uterus begins to contract at the expiration of the ordinary period of gestation, although there is no fœtus to be expelled. Taking this view of the subject, we understand why the successive contractions of the different portions of the heart are as regular and as orderly as those of the muscles of respiration, or of the muscles of the limbs in walking. We have an easy solution of the various irregularities of the circulation produced by mental emotions, and by other causes; and we also understand why the suspension of respiration must soon be followed by a suspension of the action of the heart, and why the same thing would happen even if it were possible that the irritability of the muscular fibres should remain unimpaired. There is only one fact which in the first instance may seem to be opposed to this conclusion. The heart, completely separated from its connections, and even removed from the body, will continue for a time to contract, and the contractions will be as orderly and as vigorous as if, after it was emptied of its blood, it had been allowed to remain in the thorax with its connections undisturbed. Of this, however, an easy explanation may be offered, namely, that the nerves of the heart are something more than mere conductors of the nervous influence, and that they retain the power of stimulating the fibres to contract for a certain period after they have been detached from the nervous centres.*

* These views relating to the circulation are taken from the Croonian lecture which I communicated to the Royal Society in the year 1813. The lecture was directed by the Council to be inserted in the Philosophical Transactions; but the publication was deferred at my request, as I did not consider the investigation to be sufficiently matured to be laid before the public.[1] Since the present

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[1] By leave of the Council of the Royal Society, I have copied this Lecture, and it will be found, with the other communications to that Society, in this edition of the Author's works.—C. H.

Here another question arises, of no small practical importance:—For what length of time does the heart continue to act, so as to circulate the blood, after respiration has ceased?

1st. This will depend on the age of the animal. The condition of the child before birth seems to bear a good deal of resemblance to that of a reptile; and that of a newly-born infant partakes somewhat of the same character, so that the circulation will in him continue for a longer time after the suspension of breathing than in the adult. This fact is well known to practitioners in midwifery, and it explains the great success with which they have recourse to the artificial inflation of the lungs in still-born children.

2. Something will depend, also, on the quantity of air retained in the lungs. It is remarkable, that in hanged animals, under ordinary circumstances, there is always a forcible expulsion of air from the lungs, in consequence of which they are found to be almost empty after death. This fact is well established by the experiments of the late Mr. Coleman. In a dog, whose lungs, when fully distended, would contain forty-three drachms, he found, after strangulation, that not more than one drachm was contained in the air-cells and bronchi.

Under ordinary circumstances, according to my observations, it rarely happens that the heart continues to contract so as to maintain the circulation for more than four minutes after the trachea is completely obstructed. In weak and exhausted animals the period appears to be shorter than in those that are strong and vigorous.

If animals were hanged in the act of inspiration, having the lungs distended with air, we may presume that the period would

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volume was prepared for the press I have been made acquainted with Mr. Beck's researches respecting the nerves of the abdomen; the importance of which in reference to the subject treated of above is sufficiently obvious. In Mr. Beck's dissection it is clearly shown that the branches of the splanchnic nerves are respectively accompanied by processes or elongations of the grey material of the nervous system; and Mr. Beck has informed me that he has ascertained that the nerves of the cardiac plexus possess the same compound structure. This being the case, there can be little doubt that the cardiac nerves possess the property which I have attributed to them of generating the nervous influence.

be longer than what I have mentioned; and an experiment made by Mr. Coleman justifies this conclusion.

Mr. Kite connected a bladder filled with air with a tube, and the tube with the trachea of a dog. He then kept the lungs of the dog forcibly distended by pressure on the bladder. The animal showed no signs of uneasiness for eight minutes; then symptoms of suffocation began to show themselves; nevertheless, at the end of twelve minutes the heart was still acting.

It is of great consequence that we should bear in mind that the heart will maintain the circulation of the dark-coloured blood for only a very few minutes after the trachea is completely closed. I shall show you hereafter that where, under these circumstances, the circulation has once ceased it can never be restored.

I know that what I have just stated, as to the period of time during which the heart may continue to act after respiration has ceased, may appear to be in contradiction to what has been stated by some other physiologists. But observe, that I speak only of those orderly, regular, and vigorous contractions, by which, and by which only, the circulation of the blood can be maintained. There are other irregular and feebler contractions, which correspond to those of the *panniculus carnosus* in a newly-slaughtered bullock, which may continue for a much longer period, and which, when the heart has become quiescent within the chest, may be re-induced on its being exposed to the air. But these are no more capable of carrying on the circulation of the blood, than the irregular contractions of the muscles of the limbs, produced by a voltaic battery, are of causing an animal to rise and walk. These two kinds of movements are easily to be distinguished from each other. Yet the distinction has often not been made, and the want of it has led to many errors, both of theory and of practice.

The first symptoms which are observed in a hanged animal are a dark colour of the lips and nose, and of other parts in which the hue of the blood can be observed, the result at once of venous congestion and of the want of oxygenation of the blood.

Then there are involuntary actions of the muscles, producing convulsions which are frightful to those who behold them, but of which there is no reason to believe that they are indicative of pain more than the convulsions of an epileptic fit. If at this period the eyes be touched, there is no motion of the eyelids; and those who have recovered from the effects of strangulation have no recollection of their having been in a state of suffering. The contact of the dark-coloured blood with the brain and spinal cord sufficiently explains the involuntary spasmodic actions of the muscles; and from all that we can learn on the subject there is great reason to believe that the sensibility of those organs is destroyed at a very early period.

The diaphragm and intercostal muscles, however, continue to act for some time, or rather attempting to act; for as the trachea is obstructed they cannot act to any purpose, so as to enlarge the dimensions of the chest. The period during which these efforts to inspire continue is not the same in all cases. On an average it may be as much as one minute and a half or two minutes; when they cease the pulse of the heart and arteries is still distinctly to be felt, and the action of the heart continues of sufficient strength to maintain the circulation for two or three minutes longer.

If the ligature be removed from the neck before the contractions of the diaphragm have ceased, air is of course drawn into the lungs; the blood which is still circulating through them becomes decarbonised; scarlet blood passes into the left auricle and ventricle of the heart, and from thence is distributed to the muscular structure of the heart itself, to the brain and spinal cord, and other organs. Respiration continues, and the action of the heart is maintained in the usual manner.

Or, if the contractions of the diaphragm have ceased, and in the very short interval during which the heart continues to act afterwards the lungs be inflated, so as to produce artificial respiration, the usual change is produced in the quality of the blood; the circulation continues; in the course of a few minutes the animal makes a spontaneous effort to breathe; other efforts follow, and then, if the artificial respiration be dispensed with, he continues to breathe as under ordinary circumstances.

Still the consequences of the strangulation are not at an end, nor is ultimate recovery a matter of course because natural respiration is restored.

It would be tedious for me to relate to you all the particular observations which I have made on this interesting and important subject; and it will be sufficient to make you acquainted with their general results.

The effects produced by the circulation of dark-coloured blood are not merely negative. It operates like a narcotic poison, and even after natural respiration is restored the animal remains as insensible to external impressions, and as incapable of voluntary movements as if he were under the influence of opium, or the woorara. While in this state he is not unfrequently affected with convulsive actions of the voluntary muscles; and even when he first begins to recover there is occasionally, in quadrupeds, a more or less complete paralysis of the muscles of the hind limbs. The state of coma may continue for a few minutes, or for an hour, or even for several hours, the period probably varying according to the length of time during which the dark-coloured blood was circulating. If in one case the cord be removed before the natural efforts to respire have ceased, and in another only just in time to maintain the heart's action by artificial respiration, the period of recovery will be very short in the first case, and probably very long in the second. In some instances, after remaining for a considerable time in a state of coma, respiration is again suspended; so that if recovery had been effected in the first instance by means of artificial respiration, the animal may be said to die a second time. In others, although sensibility is restored, and with it the power of locomotion, it is only for a time; another attack of coma follows, and this is fatal.

These statements are founded chiefly on experiments made on the lower animals, but there is no essential difference between the phenomena which occur in them and in the human subject. The case which I am about to mention justifies this observation. It was communicated to me by Mr. Rose, under whose care the patient was placed. A boy, of the name of William Claridge, seventeen years of age, attempted to hang himself in the evening of the 17th of July, 1820. He was discovered after a short period of suspension (the exact length of the period being unknown), and immediately cut down. He was at this time completely insensible; his face was livid, his lips were of a dark purple colour, the pupils of his eyes were dilated and motionless, his pulse not perceptible at the wrist. A pair of bellows being at hand, artificial respiration was immediately had recourse to. In about a quarter of an hour the diaphragm began to act. The artificial respiration was now discontinued. He breathed at irregular intervals, with stertor, and a rattling noise, from the air passages being choked with mucus. The pulse was now perceptible, but often flagging, and the surface of the body was disposed to be cold. The countenance was still of a livid hue, but the breathing became more frequent and regular, and there was also an improvement in the pulse. At the end of another hour an attempt was made to take some blood from the arm, but it was not successful; and from the coldness of the surface of the body it was thought expedient to place him in a warm bath. During the night he continued to breathe, the stertorous breathing continued. In the morning a vein was again opened in the arm, and twelve ounces of blood were taken away, but no relief followed. He continued insensible, cold on the surface, and frothing at the mouth, and died at the end of twenty-four hours from the time of his having been cut down.

The body was carefully examined. The vessels of the brain seemed to be turgid with dark-coloured blood, but there were no other morbid appearances.

Dr. Latham has given me some particulars of another case a good deal similar to the last, but having a more fortunate result. A labouring man, with a family, had been drinking day after day until all his money was exhausted. After a night's sleep he awoke sober, but to a sense of such desperate remorse that he went into a cellar and hanged himself. How long he had been hanging nobody knew; but when he was cut down he was supposed to be dead. He was, however, only insensible, and in that state he was taken to the Middlesex Hospital, where he lay for a considerable time insensible, and breathing with an apoplectic stertor, but eventually recovered.*

Treatment to be had recourse to in Cases of Strangulation.

Death from strangulation takes place at so early a period, that, in the case of a human being at least, it only occasionally happens that the interference of art can be of any service. At all events it can be only by a sort of accident that you will see the patient in the first instance. But such an accident may occur, and you should know how to meet it.

Let us suppose, then, that the cord is removed from the neck before the efforts of the diaphragm to draw in air have ceased: all that you have to do is to watch the patient carefully; if natural respiration continues, to leave him to himself; if it ceases, to supply the want of it by inflating the lungs artificially.

If, on the other hand, the efforts of the diaphragm have already ceased, you must have recourse to artificial respiration without delay. The interval which elapses between the suspension of the efforts of the diaphragm and that of the action of the heart, being never more than two or three minutes, you have no time to lose, no leisure for inquiries. If the pulse can be felt, either of the heart or of the arteries, you will know that your patient may probably be saved. But the pulse may be imperceptible, and yet some feeble action of the heart may continue sufficient to maintain the circulation, and you must give your patient the chance which artificial respiration affords him, however small it be. If the circulation be still going on, and the process be properly conducted, a few minutes will be sufficient to restore the pulse, and in a few minutes more the diaphragm will begin to act spontaneously, and then the artificial respiration may be dispensed with.

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* After his recovery a phenomenon was observed similar to what occurs after injuries of the brain; he had no recollection whatever of his attempted suicide.

But you cannot lose sight of your patient, nevertheless. I have already explained that the circulation of the dark-coloured blood through the brain leaves behind it the effects which are produced by a narcotic poison. The patient may remain in a state of coma, breathing laboriously and with stertor. By and by the breathing may cease altogether, and here, then, is a second period, at which artificial respiration may be necessary to preserve his life; and the fact is that it can scarcely ever happen, even in the course of a long practice, that you will have the opportunity of employing artificial respiration during the first of these periods, while you may every now and then find it necessary to have recourse to it during the second.

The mode of conducting artificial respiration claims our attention next; and I am tempted to extend my observations on it, because I find but little information on the subject in books, and because there are other occasions besides those of persons labouring under the effects of strangulation, in which it may be required.

In some animals, as in the rabbit, a considerable quantity of air may be made to enter the lungs by merely elevating the ribs. Something may be done by the same process in the human subject, but certainly not sufficient for the maintenance of life. The only effectual method of supplying the want of natural respiration is that of inflating the lungs by a pair of bellows, or a syringe, or some similar contrivance.

This may seem to be a very simple matter, but it is not quite so simple in reality. The air impelled into the lungs should be as much as is inhaled in ordinary respiration; but not more than this, for, independently of other objections, there would then be danger that the too forcible distension of the air-cells would cause a portion of the air to enter the blood-vessels, thus occasioning almost instantaneous death. Again, the inflation of the lungs should be performed at proper intervals, so as to resemble natural respiration as nearly as possible. The operator should have a watch with a second hand before him: when the pulse can be felt it may be counted by an assistant, and the lungs may be inflated accordingly, it being borne in mind that, under ordinary circumstances, there are three inspirations for one pulsation of the heart and arteries.

Various contrivances have been proposed for the purpose of inflating the lungs; the single and double bellows, elastic gum bottles; and syringes of different kinds. It has been recommended, that the tube of inflation should be introduced into the trachea, through the aperture of the glottis, or through an opening made artificially, or that it should simply be passed into the nostril. Some have suggested that the air introduced into the lungs shall be exactly measured by means of a graduated syringe; others, that the air should be previously warmed; and others, again, that oxygen gas should be employed instead of atmospheric air.

Before we consider the value of the several suggestions, I may observe, that in these cases, for the most part, you must be content to do the best in your power with the machinery which you have at hand. You may have a graduated syringe in your possession, or an apparatus for warming the air, or a gasometer full of oxygen gas, but you cannot carry them always with you; your house may be a mile, or even ten miles off, and while you are sending for what you think you want, the precious moments are running away, and your patient is gone for ever.

And the fact is, that none of these things are necessary. There is no reason to believe that warm air is better than cold, perhaps it is not so good; and there is great reason to believe that pure oxygen gas is not fitted for respiration, and, at any rate, that it is much inferior to that happy mixture which constitutes the air of the atmosphere.* A graduated syringe would tell you nothing, unless the tube of inflation were so closely fitted to the trachea that no air could escape by its side. The introduction of a tube into the trachea, in this class of cases, is not only not at all required, but it is much less convenient than the introduction of it into the nostril. The double bellows, which some have recommended formerly, is neither more nor less than a gross absurdity.

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* This opinion is fully confirmed by some very interesting observations made by Mr. S. D. Broughton, F.R.S., and published in the twenty-eighth volume of the Quarterly Journal of Science, Literature, and Art. Animals confined in vessels filled with oxygen gas, after a certain time, fell into a state of stupor, as if under the influence of a narcotic poison, and died. The heart continued to

In the course of my physiological investigations I have had a large experience in the employment of artificial respiration in animals; and I have had some experience of it (though a small one as compared with that in animals) in the human subject; and I shall be able in a few words to inform you of the result of my observations on the subject.

Where the respiration is obstructed by inflammation and swelling of the mucous membrane of the pharynx and larynx, or by a tumour in this situation, the lungs can be inflated only by means of a tube introduced into the trachea. It sometimes may, and sometimes may not, be possible to introduce a curved silver tube into the *rima glottidis*; but it is a little difficult to do so under the most favourable circumstances, and I conclude that there is always danger that a foreign body in the glottis will excite irritation, as soon as the sensibility of the patient is restored. The simplest mode of proceeding is to make an opening with a double-edged scalpel in the space between the cricoid and thyroid cartilages, this situation being more convenient (where time is valuable) than one lower down, on account of the smaller quantity of dissection which is required for the exposure of the trachea in the former case, and the greater liability to hæmorrhage in the latter.

However, in the cases of strangulation which are now under our consideration, where the cause of the strangulation can be removed, it is not only not necessary to introduce a tube into the trachea, but

act after respiration had ceased; and if artificial respiration was had recourse to, and the lungs inflated with *common* air, the animal was restored to life. These effects were produced although the air was so little deteriorated that a second animal, introduced into it after the first animal had been poisoned, breathed for a time with perfect ease. In these experiments the blood in the veins had the same bright scarlet colour with that in the arteries.

it is a great deal better not to do so. A tube introduced into one nostril will answer every purpose, and this method possesses one very great advantage, that it is attended with no delay. A short ivory tube, of the size of the anterior aperture of the nostril, and with a projecting rim, to prevent it slipping in beyond your reach, is very convenient for the purpose; but this may not be at hand; and you will find a large elastic gum catheter, a piece of card rolled into a cylinder, or the nozzle of a pair of bellows, to answer the purpose well enough, and at all events any one of these may be used until you are provided with a better apparatus.

In smaller animals, there is no more convenient machine for impelling air into the lungs than an elastic gum bottle. But the gum bottles commonly in use are not sufficiently capacious to be used in the human subject, and nothing can be more convenient than a pair of bellows. Bellows made expressly for the purpose should, when fully expanded, contain from fifty to sixty cubic inches of air, and should have a flexible tube adapted to the short ivory tube which is fitted to the nostril. But on most occasions you must make shift with any bellows that you can obtain at the moment, and must probably be content to insert the nozzle itself into the nostril. Even these may not be to be had at once, and you must then be content, in the first instance, to inflate the lungs by your own breath, or by that of another person, with the aid of a gum tube, or any other tube that can be procured.

During the process of inflating the lungs, the upper part of the patient's person should be exposed, and the operator will then know, by observing a gentle elevation of the chest and abdomen, that the lungs are sufficiently inflated. As I have already stated, the number of inflations in a minute should not exceed that of ordinary inspiration, and care should be taken not forcibly to distend the lungs, lest a portion of the air should be forced into the ramifications of the pulmonary vessels. But it is needless to give directions as to the exact admeasurement of the air. However good this may be in theory it is practically impossible. A portion of the air escapes by the other nostril and the mouth, and these apertures must not be closed, as they form a safety-valve, which will do more towards preventing the over-distension of the lungs than the most ingenious apparatus. Still something must be left to the prudence of the operator, especially if the bellows be of a large size; and he must bear in mind that the quantity of air which is required at each artificial inspiration is not only not greater, but that it may even be less than in natural breathing. There is only one further precaution necessary; an assistant should press the thyroid and cricoid cartilages against the vertebræ so as to close the upper extremity of the œsophagus, otherwise a portion of air will at each closure of the bellows find its way into the stomach, gradually distending it until it prevents the descent of the diaphragm and the entrance of the air into the lungs altogether.

The only source of danger in the operation of artificially inflating the lungs is that of the forcible impulsion of air into the circulating blood through the thin tunics of the capillary vessels of the lungs; and by attending to the precautions which have been just enumerated this accident is easily avoided. But the question will arise, May not the same object be attained by other means? Undoubtedly the influence of voltaic electricity properly applied will bring the diaphragm and intercostal muscles into vigorous action, and may be used in physiological experiments as a substitute for the other method. But it is quite inapplicable in surgical practice. A pair of bellows may be obtained anywhere: but a voltaic battery, or any other apparatus that may be substituted for it, is not to be had at the moment, and even if it were, some time will be required for bringing it into operation, during which the heart will cease to act. But, further than this, even in physiological researches, the voltaic battery is much less convenient than the bellows or the elastic gum bottle. To apply it properly an incision must be made in the neck, and another in the abdomen, for the purpose of applying the wire to the diaphragm, and even then its effects will not be confined to the diaphragm, but other muscles will be brought into action, the action of which is not only not required, but inconvenient or actually injurious.

It cannot be too strongly impressed on your minds that in these cases for the most part there is no time to be lost. If the natural efforts to respire have actually ceased, the cessation of the heart's action will take place in the course of a very few minutes. If the patient recover from the first effects of the strangulation, but lies with stertorous respiration, and other symptoms of apoplexy, he may cease to breathe altogether at any moment; *and if that action of the heart by which the circulation is maintained should cease, as a consequence of the suspension of respiration, it can never be restored. This I positively assert, after having made it the subject of a very careful investigation.* If others have held a different opinion, it is because they have confounded those feeble and irregular contractions of the heart, which may last for a long time, but which mean nothing, with those regular and powerful movements which are necessary to propel the blood through the system. The most probable means of restoring the action of the heart would seem to be the application of voltaic electricity. But Bichat distinctly states that it has no influence whatever over the involuntary muscles; and, without venturing either absolutely to confirm, or absolutely to deny this assertion, I am bound to say, after having made many experiments on the subject, that when the mode of death is that to which the name of asphyxia has been commonly but (according to its etymology) most absurdly and improperly applied, the application of electricity in any form to the heart is altogether useless. Nor is this conclusion at all different from that which *à priori* we might have expected. When the order of the phenomena in a dying animal is such as I have just described, there is nothing in the circulation of the dark-coloured blood which can renew the failing powers, either of the muscular fibres of the heart, or those of the nervous system. The case is entirely different from that of death from syncope, where the action of the heart ceases at the same time with that of the muscles of respiration, or probably sooner. Here the animal dies, having the left auricle and ventricle distended with scarlet blood. The heart is quiescent; but neither has its irritability become exhausted, nor has the nervous system been narcotised, by the circulation of blood of a different quality. It is no matter of wonder that under these circumstances the heart should be able to resume its functions, and perform them with as much energy as before; and that it may do so, even when syncope has been produced by the introduction of the infusion of tobacco into the intestinal canal, is sufficiently proved by an experiment of which you will find an account in my first series of observations on the effects of poisons in the animal system.*

What remains to be said of the treatment after strangulation may be comprised in a few words.

It has been recommended that blood should be taken by venesection, or in some other way. But in the case of the patient treated by Mr. Rose this was done without any apparent advantage. I am not aware that there is any actual experience in favour of this practice; still, as congestion of the vessels of the brain may be one of the effects of strangulation, I do not feel myself justified in saying that it is never proper. The practitioner must be directed by the circumstances of each individual case, forming his judgment especially from the state of the pulse, but bearing in mind that the circulation of dark-coloured blood, during however short a period of time, cannot have taken place without a diminution of the powers of life, and that, if blood be taken at all, it should be done prudently and cautiously.

Another remedy has been recommended in the shape of the warm bath; but I cannot doubt that whatever advantage it may afford, may be obtained by keeping the patient in an atmosphere of a moderately warm temperature. In fact, whenever the effects of strangulation are of long continuance, this is absolutely necessary to compensate for the insufficient generation of animal heat, which is the consequence of the impaired state of the functions of the brain, whether arising from the influence of a narcotic poison, or from another cause.

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* Philosophical Transactions, 1811.

ON THE

MODE OF DEATH FROM DROWNING.

ANIMALS that are intended to respire the air which is dissolved in the water by means of gills are generally capable, within certain limits, of respiring the air of the atmosphere, and there are some fish in which life may be thus maintained for a considerable time after they have been removed from their natural element. Mr. Clift has furnished me with the following observations made by him on the Lamprey. Under certain circumstances he may be seen attached to a stone above the level of the water, closely adhering to it by means of the powerful muscles of the mouth, which produce a vacuum with all the force of a piston. He inhales the air through a tube, which may be regarded as having some analogy to the trachea, and which communicates with the cavities that contain the gills; and the air received in this manner passes out through the seven orifices which are placed on each side of the thorax, ascending from thence in bubbles to the surface of the water. In this manner he may be observed to continue to breathe for many successive hours.

Dr. John Davy has informed me of some interesting observations, which he has made on another fish; the Benito (the *Scomber pelamis* of Linnæus).

The Benito seems to breathe in the air with not much less facility than in the water, and even to seek opportunities of exercising the former method of respiration; as if he were striving to pass the barrier which separates him from that higher order of animals in which the more perfect oxygenation of the blood occasions the development of a larger portion of nervous energy.

But the converse of the proposition which I have just stated does not, as far as I know, hold good in any one instance. Animals which are constructed to breathe the air of the atmosphere by means of lungs, or of organs analogous to lungs (those few reptiles only being excepted which are provided with gills also), can breathe the air of the atmosphere only; and from man, the head of the creation, down to the snail or caterpillar, we find that they all die, when retained for a limited space of time beneath the surface of water.

Although a diversity of opinions may have existed formerly as to the mode in which submersion in water produces death, there is no such diversity at the present time. Death from drowning is similar to death the consequence of strangulation; and the want of the due oxygenation or decarbonisation of the blood is the sole cause of the animal's destruction.

If a small animal be immersed in water in a transparent glass vessel, the phenomena of drowning are readily observable. There is first a deep expiration, by which bubbles of air are expelled from the lungs. There is then an effort to inspire; but the effort is ineffectual, there being no air which can be received into the lungs; and a spasm of the muscles seems to prevent the admission of water in any considerable quantity into the trachea. The attempts to breathe are repeated several times; and after each attempt a small quantity of air is expelled from the mouth and nostrils, until the air-cells of the lungs are almost completely emptied. Then the animal becomes insensible, and convulsive actions of the muscles mark the instant when the brain begins to suffer from the influx of the dark-coloured blood. After these convulsions the animal is motionless, and gives no signs of life; but if the hand be applied to the thorax the pulsation of the heart, gradually becoming fainter and fainter, indicates that some remains of vitality still linger in the system. Before the circulation ceases altogether, the muscles of respiration resume their action, and some ineffectual efforts are again made to breathe. It is a remarkable circumstance that the diaphragm continues to exert itself nearly as long as the heart itself, so that the interval between the cessation of the attempts to breathe and the cessation of the motions of the heart, short as it is in animals that die of strangulation, is shorter still in those that perish from drowning. These phenomena follow each other in rapid succession, and the whole scene is closed, and the living animal is converted into a lifeless corpse, in the brief space of a few minutes. I have never opened the thorax of an animal in which the heart was found acting in such a manner as to maintain the circulation of the blood so long as five minutes after complete submersion; and from the information which I have received from some of the medical attendants at the receiving houses of the Royal Humane Society, I am led to believe that the period is very rarely, if ever, longer than this in the human subject.

I have remarked that a spasm of the muscles of the glottis seems to prevent the admission of water into the windpipe. Experiments have been made of drowning animals in various coloured liquids in which the coloured substance has been scarcely perceptible in the lungs on dissection. In a large cat which was drowned, I found less than a drachm of water in the ramifications of the bronchi. Dr. Goodwyn drowned a cat in quicksilver, and found not more than half an ounce even of this ponderous liquid in the lungs. It does not appear, however, that the admission of water into the lungs tends to hasten death, or that the spasm of the muscles of the glottis has any effect in preventing dissolution. I drowned a guinea-pig, in which I had previously made an opening in the trachea, so that the spasm of the glottis could have no effect in preventing the water from entering the lungs; but this made no difference in the symptoms which were produced, and did not prevent the restoration of the animal to life by proper methods. Dr. Goodwyn injected two ounces of water into the trachea of a dog, which at first occasioned some difficulty of breathing. This difficulty soon subsided; nevertheless, when the animal was killed some hours afterwards, the remains of the water were still found in the bronchial tubes. If water were injected into the lungs in sufficient quantity to prevent the admission of air, of course it must occasion suffocation; but there is no manifest reason why the admission of a small quantity of water should be very injurious.

That the admission of water into the lungs is prevented by a spasm of the muscles of the glottis cannot, however, be doubted, since we are unable to account for the exclusion of it in any other manner; and a multitude of circumstances prove that these muscles form a sphincter to the windpipe, as perfect in its functions as any sphincter in the body.

I have said that in a drowned animal there is always a deep expiration by which the air is almost completely expelled from the lungs. Mr. Coleman examined the lungs of a cat which had been drowned, by placing a ligature on the trachea, removing the lungs from the thorax, and then making an artificial opening below the ligature, all this being done under water. The air which escaped when the opening was made amounted only to half a drachm, yet the same lungs, when inflated, required two ounces of air for their complete distension. Were it possible for a man, having made a deep inspiration previously to his immersion in water, by means of a powerful effort, to restrain the action of the abdominal muscles, on which the forcible expulsion of air depends, we must conclude that life would be less speedily extinguished. I may here refer you to some observations on this subject which I made in my lecture on the effects of strangulation, and which it is unnecessary for me to repeat.

The question has been much agitated, For how long a period may an animal remain under water, without having the opportunity of rising to the surface, and yet be taken out alive, or in such a state as to admit of recovery? The fact is, that there is here no exception to the ordinary rule as to suffocation. A young animal may not die so soon as an old one. A strong and healthy animal may survive during a longer period than one that is in a state of exhaustion or debility. But in all cases, as I have already stated, the circulation ceases within four or five minutes from the moment of the last inspiration,* and there is reason to believe that the period, in many instances, is even shorter than this. In my experiments I have found the action of the heart to be generally more feeble in animals which are drowned than in those which are strangled; and I know not to what this difference can be attributed, unless it be the additional shock which the former species of death occasions to the nervous system, in consequence of the immersion of the animal in a cold medium which rapidly carries off the animal heat.

But it may be inquired, How are these observations to be reconciled with the ordinary histories of divers, who have become so expert in the art which they profess as to be capable of remaining under water for twenty minutes, or even for a longer period? For these tales, which have been imported from foreign and distant lands, a parallel may be found in our own country; and the cases which have been reported to the Royal Humane Society of drowned persons who have been restored to life, when taken up cold and breathless after an immersion of half an hour, show that it is not travellers alone that are guilty of the vices of exaggeration and invention. We are compelled to regard these as mere extravagant fables, not more authentic, though certainly less poetical and elegant, than those of nymphs and mermaids, who reside in grottoes beneath the waves of the sea, or than those Arabian fictions, which have astonished our youthful imaginations with the history of submarine nations, whose princes dwell in palaces of crystal at the bottom of the ocean.

With respect to the time during which divers can continue under water, I may refer you to the account given by the Reverend Mr. Cordiner, in his description of Ceylon. This gentleman, who resided for several years at Columbo, in the situation of chaplain to the garrison, was present at the pearl fishery, and it will be seen how far his authentic statement differs from the vulgar reports which have been circulated on the subject. 'The diving stone,' he says, 'of the weight of fifty-six pounds, hangs from an oar by the side of the boat, and connected with the upper part of this stone is a rope, making a strong loop for receiving the foot of the diver. The diver, having only a thin slip of calico about his loins, puts his foot into this loop or stirrup at the top of the stone, and holds with his hands the rope by which the stone is connected to the oar. He remains in this position for some time, supporting himself by the motion of one arm; then a basket, formed of a wooden hoop and network, suspended by a rope, is thrown into the water, and in it he places his other foot. When he feels himself properly prepared and ready to go down, he grasps his nostrils with one hand, to prevent the water from rushing in, and instantly descends. As soon as he touches the bottom he disengages his foot from the stone, which is immediately drawn up, and suspended again to the projecting oar to be in readiness for the next diver. The diver at the bottom of the sea throws himself as much as possible on his face, and collects everything that he can get hold of into the basket, and the man who holds the other end of the rope hauls it up as speedily as possible: the diver, at the same time, being free from every incumbrance, warps up by another rope, and always gets above the water a considerable time before the basket.' Mr. Cordiner then remarks, that he 'observed with attention the time during which many of the divers remained under water, at the depth of seven fathoms. Some of them performed the dip within the space of one minute; others came up in one minute and twenty seconds. Some persons who have frequently attended the fisheries, and accompanied the divers to the banks, consider one minute and a half to be the longest period during which any diver remains under water. Other gentlemen, who are willing to allow the greatest latitude, say that they certainly never knew a diver to exceed two minutes.'

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* Mr. Woolley, the intelligent and zealous surgical attendant at the Receiving House of the Royal Humane Society in Hyde Park, believes that very few lives are preserved after four minutes of complete submersion. In the year 1840, however, he met with a case in which a person recovered, although there was reason to believe that he had been five minutes under water; and a similar instance has since come under his observation. See a very interesting report by this gentleman in the account of the proceedings of the Humane Society for 1840.

It is probable that this last is above the proper estimate; and Dr. Davy, who resided for a considerable time in Ceylon, who did not, indeed, witness the pearl-fishery himself, but had ample opportunities of procuring authentic information from others, assures me that the average time of diving is less than a minute. We cannot suppose it to be even so long as this, unless we also suppose that the diver descends immediately after a deep inspiration, so that he carries down a certain quantity of air with him.

With respect to the fables of drowned persons reported to have been restored to life after submersion for so long a period, it may be just to remark, that although most of them may have originated in a disposition to exaggerate, and to convert events which are interesting into events which are marvellous, it is probable that some of them may be attributed to unintentional error. A man in the act of drowning may rise more than once to the surface of the water, each time inhaling a supply of air by which his destruction may be retarded. I suppose, moreover, that it is not probable that a person on the bank of a river would observe another, who is drowning, with a watch in his hand, so as to reckon the exact number of minutes which elapse before this terrible scene is closed. We all know that our estimate of time depends on the number of circumstances which successively attract our notice. When an event occurs which powerfully impresses the mind, we watch every one of the minutest changes that take place, and the time which elapses before the whole event is completed appears to be proportionally prolonged. Thus we hear of earthquakes in which the commotion of the earth is said to have continued during the space of eight or ten minutes, although in all probability they lasted for no longer time than thirty seconds; and in the same manner we may account for the mistakes to which I have just alluded. When the infidel sultan of Egypt refused to believe that Mohammed could have ascended into the seven heavens, and held one thousand and one conferences with the Deity in the brief space of a few minutes, the Mussulman divine, who was consulted on the occasion, endeavoured to bring his majesty to a more strict faith, by demonstrating that a short space of time was converted into a long one when a great number of important events were crowded into it.

The observations which I have made respecting the time in which animals are irrecoverably destroyed by drowning relate to those which are warm-blooded, and live on the surface of the earth. But there is an extensive tribe of warm-blooded animals, which, although they respire the air of the atmosphere, yet live wholly in the water, or else pass the greater portion of their lives in it; and as these have frequent occasions to dive in search of their prey, it is probable that they may have the power of remaining under water for a longer period than animals which are placed under different circumstances. There is reason to believe that this observation is applicable even to aquatic birds. Mr. Robert Boyle, in the fifth volume of the Philosophical Transactions, gives an account of some experiments made by himself, in which he found that the smaller birds were completely dead after submersion for a single minute, whereas a duck showed no signs of uneasiness for two minutes; then began to struggle, and continued to do so, and to emit bubbles of air from the mouth for four minutes, so that four minutes had elapsed before death had *apparently* taken place. With respect to cetaceous animals, it is difficult to procure any exact information as to the time during which they can remain in the water without coming to the surface to breathe; but we may reasonably conclude, that an animal which resembles fish so much in its form and mode of life, would be endowed with the faculty of diving in greater perfection than ordinary mammalia. There is a peculiar structure of the vascular system of these animals, which has been described by John Hunter, which has been overlooked by some of the most eminent comparative anatomists of a later period, and has not generally attracted so much attention as it seems to me to merit. John Hunter, in his observations on the structure and economy of whales, remarks, that 'the intercostal arteries divide into a vast number of branches, which run in a serpentine course between the pleuræ, ribs, and their muscles, making a thick substance, somewhat similar to that formed by the spermatic artery of the bull. These vessels, everywhere lining the sides of the thorax, are seen between the ribs, near their articulations, and also behind the ligamentous attachments of the ribs, anastomosing with each other. The *medulla spinalis* is surrounded by a network of arteries in the same manner, more especially where it comes out of the brain, where a thick substance is formed by their ramifications and convolutions, and these vessels most probably anastomose with those of the thorax. The subclavian artery in the piked whale, before it passes over the first rib, sends down into the chest arteries which assist the intercostals in forming a plexus on the inside of the ribs. There are similar plexuses formed in the neck of the whale by branches of the carotids.' Whoever will examine the preparation which I now show you, exhibiting this remarkable structure, and which appears to have been taken from a porpoise of no great size, will perceive that Mr. Hunter's description scarcely gives an adequate notion of the magnitude and extent of this mass of convoluted arteries. We cannot but suppose, that it must answer some important purpose connected with the peculiar habits of the being to which it belongs. It is evident that this enormous vascular plexus forms a reservoir of blood, containing many times the quantity that is expelled from the heart at each contraction of the left ventricle; and that it is a reservoir of scarlet arterial blood, which has not yet been used for the purposes of life, not having passed through the capillaries of the general system since it was exposed to the influence of the air in the lungs. When the animal plunges beneath the waves, and respiration is suspended, the scarlet blood in the plexuses must gradually become mixed with the dark-coloured blood that is returned from other parts, and this admixture cannot fail to render the whole mass of the circulating blood more pure, and better adapted to the maintenance of the animal functions, than it would have been otherwise. Is it not then reasonable to suppose that this peculiar structure enables the whale to subsist with longer intervals between his respirations than other warm-blooded animals? If it does not answer this purpose, what other purpose is there for which it can be designed? It may be observed, moreover, that some of the principal plexuses are connected with the vessels of the brain and spinal cord, as if it were intended that this reservoir of arterial blood should especially belong to these organs, to which the dark-coloured venous blood is the most injurious.

If an animal be taken out of the water before he is completely drowned, and the diaphragm contracts afterwards, so as to draw air into the lungs, before the action of the heart has ceased, the action of the heart is maintained, and the animal continues to respire. Nevertheless, although he has recovered from the first effects of the injury, his ultimate recovery remains uncertain; and after drowning, as after strangulation, there is a second period at which death may take place. The animal lies motionless, insensible, with dilated pupils, and laborious breathing. In the majority of instances, after a certain time has elapsed, there take place spasmodic contractions of the voluntary muscles, and these are the forerunners of complete resuscitation. But in other instances the difficulty of respiration continues; it is performed at longer, and then at still longer intervals, until at last it altogether ceases. In fact, the phenomena are similar to those which occur after strangulation, with only this difference (which is, however, one of no small importance) that there is a greater degree of coldness of the body in consequence of it having been immersed in a cold medium.

Treatment of Drowned Persons.

With respect to the recovery of persons who have been rescued from the water, when on the point of being drowned, I have little to offer in addition to what I have already stated, when I called your attention to the consequences and treatment of strangulation. As the mode of death is the same, so there must be a great similarity of treatment. There are two periods at which artificial respiration may possibly be useful. The first is that short interval of time between the cessation of the natural efforts to respire and the cessation of the heart's action. If, however, I may venture to apply to the human subject the observations which I have made in experiments on smaller animals, short as that interval is in those that are strangled, it is still shorter in those that are drowned; and it is only in a very limited number of the latter, and by some rare accident, that the opportunity can occur of inflating the lungs at this first period. The second period to which I have alluded is that during which the patient lies in a state of stupor, in consequence of the injurious effects produced by the transmission of the dark-coloured blood to the brain; and here, when natural respiration begins to fail, there is no doubt that artificial respiration may be had recourse to with advantage. But I need not occupy your time by any further observations on the subject. It is enough for me to refer you to the observations which I made in my last lecture.

In patients who are recovering from the effects of drowning, even more than in those who have been strangled, it must be of importance to supply the waste of animal heat by placing them in a warm temperature. The warm bath forms a simple and convenient method of attaining this object, and from the accounts which I have received from those who are more practically conversant with the effects of drowning in the human subject than I am, I can entertain no doubt that it produces another good effect by promoting the natural efforts to inspire.

Whether the abstraction of blood be ever useful is even more doubtful in cases of drowning than in those of strangulation, there being in the former, for obvious reasons, a smaller liability to congestion of the vessels of the brain.

On the whole, it must be acknowledged that in both orders of cases the resources of art are limited, and that of those who recover from a state approaching to dissolution a greater number will owe their recovery to unassisted nature, than to the most judicious treatment. But let us not on this account undervalue the knowledge which physiological investigations throw on this interesting subject. The preservation of the body from the influence of external cold must be always important, where the progress of recovery is tedious; and although the cases in which the artificial inflation of the lungs can be advantageously employed are rare, yet there are occasions in which the life of a dying man may be preserved by the judicious application of this remedy. Moreover we must express our obligations to science, if she teaches us to avoid things which ignorance has suggested as useful, but which are really detrimental; or even if, by attending to her instructions, we are enabled to reject what is useless and frivolous, although not absolutely injurious. We have been directed to employ friction of the surface of the body for the purpose of assisting the circulation of the blood; as if this could do any real good when the action of the heart has ceased; or as if it would not do actual harm by overloading (if I may be allowed to use such an expression) the right auricle and ventricle, when the action of the heart was still going on. The injection of tobacco, and the application of stimulants, belong to the same class of remedies which are either mischievous or useless, proposed formerly by those who did not know what to do, but who thought that they were expected to do something, but now rejected by a more enlightened physiology.

ON THE

MODE IN WHICH DEATH IS PRODUCED BY A STROKE OF LIGHTNING.

A STROKE of lightning is a shock of electricity, and of course it may produce a great variety of effects, according to its intensity, and the part of the body through which it passes.

A boy was admitted into St. George's Hospital under the following circumstances. He had several superficial sores on his abdomen and lower limbs, and he gave the following account of their origin. In the month of July, during a thunder-storm, he was sitting with several other persons under a hovel covered with thatch. A flash of lightning struck the hovel, and set fire to the thatch; the boy, and a woman who was of the party, fell senseless. The woman was instantaneously deprived of life; but the boy recovered his sensibility after the lapse of a few minutes. He had been drawn out of the hovel before he could feel any effects from the burning thatch, and his clothes were uninjured; but shortly afterwards large vesications took place about the pubes and thighs, precisely resembling those which arise from a scald; and they terminated in a similar manner, that is, in producing ulcerations. It is evident that, in this case, the electricity must have acted chiefly on the surface of the body. A corresponding case is recorded in the sixty-sixth volume of the Philosophical Transactions. A bullock, which was pied white and red, was exposed to a violent thunder-storm. A stroke of lightning consumed the white, but left the red hairs. In another volume of the Philosophical Transactions is the history of a man who was instantaneously destroyed by lightning, which made a wound in his neck, and burned the surface of the body, so that the integuments resembled scorched leather. And we may suppose the destruction of the animal body to be even more complete than this, so that every organ and every tissue should be included in it.

But a stroke of lightning may also occasion death without injuring (as far as we are capable of perceiving) the organisation of any part of the body. Wishing to determine in what manner the electric influence operates on these occasions, I instituted the following experiment. An electric battery of six jars being charged with electricity, the shock was made to pass through a guinea-pig, in the longitudinal direction, from the head to the tail. The animal immediately fell on one side, as if stunned. There were convulsive actions of the muscles of the extremities, which, however, presently ceased. The function of respiration was not interrupted. In a few minutes sensibility was restored, and the animal recovered.

In this experiment there were no marks of derangement of the vital functions, with the exception of those of the brain; and the animal suffered, as he might be expected to suffer, from concussion of the brain.

An electric battery of nine jars being charged with electricity, the shock was discharged through another guinea-pig, in the direction from the head to the tail. Immediately the animal fell on one side. There were convulsive actions of the muscles of the limbs, but it uttered no sound; and although closely watched, it was not observed that he breathed once after he had received the shock. Three minutes afterwards I opened the chest, and found the heart acting with regularity and vigour, about eighty times in a minute, and circulating dark-coloured venous blood. The peristaltic motion of the intestines also continued. On dissection, no preternatural appearances presented themselves in any part of the body, and the muscles contracted readily when submitted to the influence of a voltaic battery.

In this experiment it was evident that the electric shock did not destroy the irritability of the muscular fibre, nor did it affect the action of the heart. Death took place precisely in the same manner as from a severe injury of the head, and the animal died manifestly from the destruction of the functions of the brain. There can be no doubt that if the lungs had been regularly inflated, the action of the heart would have been maintained; and very probably in this, as in many other instances where the cause of death operates especially on the brain, by persevering in the process of artificial respiration the animal would have been restored to life.

In a third experiment there were corresponding results, although death was not the immediate consequence of the injury. The animal lay on one side; the heart was distinguished acting through the ribs, and he continued to respire; he was totally insensible, except when roused, and then he gave some imperfect signs of sensibility, like a person suffering from concussion of the brain. There were occasional convulsive actions of the voluntary muscles. In the evening, five hours after the experiment was made, he was still in the same condition, but on the following morning he was found dead and stiff.

It has been stated, on no less an authority than that of Mr. Hunter, that in a person killed by lightning there is an instantaneous and complete destruction of the vital principle in every part of the animal machine; that the muscles are relaxed and incapable of contraction; that the limbs do not become stiffened as after ordinary death, and that the body immediately begins to undergo the changes which are the result of putrefaction. That lightning never produces such phenomena as these I am no prepared to assert; but, in the experiments which I have just described, such an instantaneous extinction of vitality certainly did not take place. It is manifest that the functions of the brain were those on which the electric shock exercised its principal influence, and that the suspension of those functions was the immediate cause of death.

Now let us compare the results of these experiments with those of human beings who have been struck by lightning, and who have afterwards recovered.

One person* (as we are informed) felt an impulse on one side of his head, and his sense of hearing was impaired afterwards. Another person † felt as if stupefied, and forced to the ground he knew not how. A third individual ‡ is described to have been rendered instantly insensible; the pulse being strong, though irregular. In eight minutes he began to move his shoulders; and in four minutes more he articulated some incoherent words; but an hour and a half elapsed before he had entirely recovered his senses. This patient appears to have been under the care of Dr. Struve, a German physician, who published a treatise on the art of restoring suspended animation. He was bathed in cold water; and then covered over with earth, which was laid upon him six inches in thickness; vinegar was poured down his throat, and the powers of his constitution enabled him to recover, in despite of the doctor's remedies.

It appears to me that the facts which I have been able to collect relating to this subject lead to this conclusion, that the influence of lightning, or of a powerful shock of electricity, in the majority of cases, is expended chiefly in disturbing, or destroying, the functions of the brain; and the treatment necessary to counteract the effects of the injury may be comprised in a few words.

Expose the body to a moderate warmth, so as to prevent the loss of animal heat, to which it is always liable where the functions of the brain are suspended or impaired, and inflate the lungs, so as to imitate natural respiration as nearly as possible, whenever the animal breathes with labour or difficulty, or when he has ceased to breathe altogether by his own efforts.

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* Philosophical Transactions, vol. xxxiv.

† Ibid.

‡ Struve on Suspended Animation.

THE

HUNTERIAN ORATION

DELIVERED AT

THE ROYAL COLLEGE OF SURGEONS IN LONDON

February 14, 1837.

The annual oration which I have this day undertaken to deliver, was founded by the late Sir Everard Home and Dr. Baillie, for the purpose of commemorating John Hunter, and other illustrious individuals, who exist no longer among us, but who, while they did exist, contributed to advance the sciences, or otherwise to adorn the character of the surgical profession. It relates to the dead, but was intended for the advantage of the living. Nor can it be doubted that it is more useful for us to compare ourselves with those, whose reputation has stood the test of a long series of years, than with those by whom we are actually surrounded, who are actors in the same drama with ourselves. Of the former, at any rate, we can form a more just estimate than we can of the latter. For them, to use the language of an extraordinary woman, one of the victims of the French revolution, this is 'An appeal to impartial posterity.' There is no private friendship to raise them above their proper level; no jealousy of competitors to detract from their real merits. They stand forth as the subjects of history, in an atmosphere free from the mist of human passions. The same light shines upon their excellences, and upon their defects, and the stamp of Time has fixed the real value of their achievements.

Nothing that tends to illustrate John Hunter's history, and the formation of his character, can be considered as foreign to the subject of this discourse; and I shall offer no apology for carrying you back to a distant period, antecedent to that at which he began his career as a student of our profession.

A century has just elapsed since a young man, established as a medical practitioner in the then small town of Hamilton, in Scotland, received into his house another young man, not many years junior to himself, as a pupil, that he might instruct him, as far as his limited means gave him the opportunity of doing so, in the elements of medicine and surgery. After the lapse of three years, an intimate friendship having become established between the master and the pupil, it was agreed that they should enter into a partnership to practise in Hamilton as surgeons and apothecaries. For this purpose, however, it was thought necessary that the younger of these individuals should visit the medical schools, which had then been only lately established, in Edinburgh and London, so as to complete his education. Accordingly we find him, at the end of another year, studying anatomy in London, under Dr. Douglas, a celebrated anatomist of that day, and filling, at the same time, the office of preceptor to Dr. Douglas's children. Here new schemes of life were offered to his ambition; and the result was, that he never returned to Hamilton. Not long afterwards his friend followed his example, seeking a wider field for the exercise of his talents, first in Glasgow, afterwards in Edinburgh.

Of these young men the one, and the elder, was William Cullen; and the other was William Hunter: and such was the humble origin of two of the most remarkable men who ever engaged in the pursuit of the medical profession.

Of Cullen, you well know that his talents raised him ultimately to the high situation of Professor of Medicine in the University of Edinburgh: and that, whatever may be the estimate which we now form of his pathological doctrines, they had a most extended influence, not only at the time of their being promulgated, but long afterwards; and that his system of nosology has, even within these few years, been a principal text-book of the medical schools.

William Hunter, transplanted to London, entered enthusiastically into his new pursuits; and we find him, some time afterwards, writing to his friend Cullen in the following terms:—'Well! how does the animal œconomy appear to you, now that you have examined it, as one may say, with precision? I have good reason to put the question to you; because, in my little attempts that way, since I began to think for myself, Nature, where I am best disposed to mark her, beams so strong upon me, that I am lost in wonder, and count it sacrilege to measure her meanest features by my largest conceptions.' Not many years elapsed before he became well known as a lecturer on anatomy. This was the foundation of his fortune; but he was ultimately recognised as one of the greatest pathologists at that time in Europe.

I am not aware that there is any one present of such an age as to remember what William Hunter was as an anatomical teacher. But tradition supplies the place of memory; and I have, in the early part of my life, so frequently heard him spoken of in that capacity by older persons, that it seems to me almost as if I had been myself his pupil. He is reported to have been at once simple and profound; minute in his anatomical demonstrations, yet the very reverse of dry and tedious. Subjects, which were uninteresting in themselves, were rendered interesting by the liveliness of his descriptions; and the more important points were illustrated by the relation of cases, and the introduction of appropriate anecdotes, which, while they relieved the painful effort of attention, served to impress his lessons on the mind in such a manner that they could never be effaced. His paper on the structure of the cartilages of joints, published in the Philosophical Transactions for the year 1743 (at which time he was only twenty-five years of age, and in which he anticipated all that Bichat wrote sixty years afterwards, respecting the structure and arrangement of the synovial membranes), and his illustrations of the gravid uterus, sufficiently show how correct he was in matters of detail, and, at the same time, how comprehensive were his general views. But we have evidence that his Lectures possessed merits of a higher order than these. His paper on the uncertainty of the signs of murder in the case of bastard children, published in one of the volumes of the 'Medical Observations and Inquiries,' seems to have been little else than a transcript of a part of one of his Lectures; and it is impossible to peruse it without being struck, not only with the intellectual penetration, the great good sense, and the power of argument, which is there displayed; but also with the indications which it affords of a humane, charitable, and even tender disposition. If we may venture, from this specimen, to form our judgment as to his other lectures, their tendency must have been to improve his pupils, with respect to their moral qualities, fully as much as with respect to their professional attainments.

It is natural for a man to delight in that occupation in which he is conscious that he excels; and accordingly we find that the delivery of his Lectures on Anatomy was William Hunter's favourite pursuit. At first, he found it convenient to teach anatomy, as affording him the means of subsistence; but he continued to do so when the more lucrative pursuits of private practice had given him wealth beyond the most sanguine expectations of his early life. From this time, as I have been informed on good authority, he was accustomed to say, 'I wish to make no profit of my Lectures: I am quite satisfied if they pay their own expenses;' which, of course, included those of the anatomical department of his museum. The performance of his duties as a lecturer was terminated only by his death; and I have been informed that when his last moments had arrived, his mind still reverted to that which he regarded as the most worthy occupation of his life, and that he said, 'I wish now that I had but strength to bear being carried into my theatre, that I might tell my pupils how much comfort and happiness I feel.'

Fifty-three years have elapsed since the period to which this anecdote refers, and all but a few of the latest of William Hunter's pupils have followed their master to another stage of existence. But he has other claims on the gratitude of posterity, which will be recognised when he is forgotten as a lecturer. His various Essays, published in the 'Medical Observations and Inquiries,' and in his Commentaries, are most valuable contributions to medical literature; and whatever advances may have been made in the science of our profession of late years, no one can, even now, rise from the perusal of them, without being conscious that he has obtained something which could not have been obtained elsewhere. Yet we might almost wish that his Commentaries had never been given to the world, as they display the only marks of weakness which, looking at him at a distance, we can discern in this great man's character. They are in great measure controversial, and are composed in an indignant spirit, roused by some attempts made by his cotemporaries to rob him of his scientific discoveries. He might very safely have rested on his high reputation, and left it to others to do him justice. But what I have just mentioned were his minor works. His greatest effort as an author was his exposition of the anatomy of the gravid uterus. This subject he made peculiarly his own, by collecting the scattered portions of knowledge which already existed respecting it, and combining with them his own great discoveries. William Hunter seems to have been sensible of the value of this great undertaking. He regarded it as belonging, not to this country only, but to the world. The drawings and engravings were made by the ablest artists; and he observes in his preface, that this mode of communicating our ideas to others in many respects answers the purpose of that universal language, which sanguine and speculative minds have so long sought in vain. A Latin translation stands by the side of the English text; and it is worthy of notice, that the elegance and the simplicity of the composition in the dead language proves the author to have been as accomplished as a Latin scholar as he was as an anatomist. So anxious was he that this work should be in all respects as complete as possible, that he had it printed by Baskerville; and he observes that 'the additional expense of Mr. Baskerville's art was incurred, not for the sake of elegance alone, but also for the advantage of his paper and ink, which render a leaf of his press-work an admirable preserver of the plates between which it is placed.'

If we inquire into the private life of William Hunter, we find that he was never married; that his domestic establishment was on a very limited scale, and that his habits were of the most frugal kind. But let us not suppose that this was in any degree the result of avarice. He had no taste for those luxuries, or for that display, for which wealth is usually exchanged; or, at all events, he had another object in view, which he prized more highly than these: and in whatever related to this, he was liberal even to extravagance. I need scarcely say that I refer to his museum. I have already had occasion to mention that part of it which related to anatomy. It was collected for the purpose of illustrating his Lectures; and its chief value consisted in the preparations illustrative of the changes of the gravid uterus, in those relating to diseased structure, and in the catalogue. The latter is replete with the most interesting pathological information on a great variety of subjects; and I am greatly deceived by my juvenile recollections of it, if I am not justified in asserting that the publication of it, even at the present time, would be of the greatest service to our profession.

But many present remember, as I do, that the anatomical department occupied only the gallery of the building in which the museum was placed. A most valuable and extensive library, and a costly collection of medals and minerals, filled the lower part of it, and served to demonstrate that the collector of these treasures could well estimate the value of other branches of knowledge, as well as those in the pursuit of which he was himself engaged. There was a collection of paintings also, by the first masters, but deposited in other apartments. It is said, that the expense of forming the museum did not amount to less than 100,000*l*., the whole of which was derived from the savings of a laboriously earned professional income.

This museum is now deposited in the University of Glasgow. We cannot grudge the possession of it to that institution, which had the honour of forming the young mind of him, who has done us so much honour since. But some persons may be of opinion that, as it would have been more accessible, so it would have been more useful, if placed in this metropolis of the world rather than where it now is. Such seems to have been William Hunter's opinion also. How it happened that he altered his original intentions respecting it is so well known, that it may seem almost superfluous to say a word on the subject. He pointed out to the Government of that day, a vacant piece of ground belonging to the crown lands in the vicinity of Charing-cross, on which, if it were granted to him for that purpose, he offered to erect a suitable building, and establish his museum, at the same time endowing a Professorship, and to bequeath the whole to the public. The minister to whom this proposal was made, scarcely condescended even to answer William Hunter's letter!

Those who consider how great an influence the example, precepts, and works of William Hunter have exercised over the whole medical profession, will scarcely think that I have wandered from my subject in speaking of him on an occasion like the present. But I can offer another apology for the course which I have ventured to adopt. On the same principle on which Ulysses is made to lay claim to part of the glory belonging to the achievements of Achilles, William Hunter deserves to be honoured on account of those of his brother John:

> 'Ergo opera illius mea sunt.'

He brought the uncouth Scotch lad to London, who afterwards became one of the greatest philosophers of this country, but who might otherwise have remained to be a farmer in his native county of Lanark. It was as his pupil that John Hunter pursued his earliest studies in his profession: and it was under the influence of his example that he learned to cultivate as a science what was before little more than a practical art and trade.

I am inclined to believe that I should not at all exaggerate what we owe to John Hunter, if I were to assert that, with the exception of Sir Isaac Newton, there has been no individual, in these latter times, who has done so much as he has done towards altering and elevating the character of the peculiar sciences to which he devoted his attention; and, be it observed, that these were not sciences of limited extent. They embraced whatever belongs to the physical phenomena of life; the natural and healthy structure of animals from the lowest to the highest, and the aberrations and changes which constitute disease.

The study of comparative anatomy (that term being intended to designate the anatomy of animals generally, as contradistinguished from the anatomy of any single species) is of very ancient date. It is one of those many branches of science which occupied the comprehensive mind of Aristotle; and since the revival of the love of knowledge from the torpor of the dark ages, there have been always individuals who pursued it to a greater or less extent. But, up to the middle of the last century, these inquiries were carried on in a vague and desultory manner. A master mind was wanting, capable of grasping the entire subject; of analysing, combining, and arranging the apparently heterogeneous and discordant materials of which it is composed; and of exhibiting them in their mutual relations, forming one harmonious system worthy of the Creator of the universe. Those who attribute the glory of having first accomplished these objects to Cuvier, do great injustice to our own countryman. The labours of John Hunter preceded those of the French philosopher. In Cuvier's work on Comparative Anatomy, we find recorded an immense number and variety of facts connected with the structure of all kinds of animals; but we need only to walk into the museum of this College to see the facts themselves, displayed by the hand of John Hunter, or under his immediate superintendence. I was acquainted formerly with a most intelligent Greek, who, having received the best education which Greece afforded, passed some years in this country. This gentleman was accustomed to describe one of the advantages, which he had derived from his visit to England, in something like the following terms:—'I had acquired in Greece a good deal of the learning which is to be obtained from books; but I now know how much inferior the study of books is to the study of things.' Such is the difference, in one respect, between the lectures of Cuvier and the museum of Hunter.

But that museum is not merely a great collection of anatomical specimens. The distribution and arrangement of them indicates the most philosophical views of physiology. The mind of the student is gradually led from the elementary to the most complicated forms of animal existence. The simple functions of one race of creatures serves to illustrate what would be otherwise incomprehensible in the functions of others. It cannot be doubted, that the arrangement of the Hunterian Museum suggested to Cuvier that which he adopted in his lectures, although he deviated from it in some particulars.

Although between forty and fifty years have elapsed since the death of John Hunter, there is one part of his labours in anatomy and physiology which has only lately become known to the public. He left behind him some manuscript notes, intended to be introductory to the study of the several departments of his museum. These are now being published in the catalogue; and they exhibit, in a remarkable degree, those powers of observation, of tracing resemblances and analogies, and of generalisation, which belong to genius, and lay the foundation of discoveries. It cannot be doubted that an accomplished writer would readily convert these notes into essays, not less interesting and instructive, and certainly containing more original matter, than the introductory chapters which we read with so much delight in Cuvier's lectures.

I trust that, in the comparison which I have now made between Hunter and Cuvier, I shall not be suspected of any want of respect for the last-mentioned of these distinguished philosophers. Such are the riches of Cuvier's reputation, that there can be no inducement to claim for him any part of the wealth of others; and his most zealous admirers cannot reasonably complain, if we concede to John Hunter the superiority as a comparative anatomist and physiologist. In other matters Cuvier stands without a rival.

He was deeply versed in natural history, which Hunter cultivated merely as subsidiary to anatomy. By his researches respecting the fossil remains of animals, he became the inventor of an entirely new science; of that science, which the genius of Buckland has made one not only of universal interest, but, I may say, of practical importance, by applying it to the illustration of the great truths of Natural Theology.

It is not merely in the arrangement and construction of his museum that we are to look for the evidence of John Hunter's labours as an anatomist and physiologist. The papers, which he collected and published under the title of 'Observations on certain Parts of the Animal Œconomy;' his 'Observations on Bees;' on the 'Structure and Œconomy of Whales;' and other papers published in the 'Philosophical Transactions,' and not included in the collection to which I have just referred; and his 'Treatise on the Teeth;' are of themselves sufficient to entitle him to the highest reputation in this department of science. But I am sensible that I have no right to make that demand on your attention, which I must make, if I were to enter further into this part of our inquiry.

If we direct our attention to what John Hunter has done in pathology and surgery, we shall find that he contributed little towards the improvement of these sciences, in the way in which they have been improved by Wiseman, Pott, Samuel Sharpe, Scarpa, the French Academicians, and others, who are justly celebrated in the annals of our profession. He has bequeathed to us no histories of disease, with the exception of his 'Essay on the Inflammation of Veins,' and his 'Treatise on the Lues Venerea.' The former of these was the beginning of a new investigation, which, prosecuted and completed by others, has led to great results, probably beyond what Hunter himself had ever anticipated. The latter is a most elaborate work, and contains a great number of interesting pathological speculations, and other important matter; but it must, nevertheless, be acknowledged, that it affords but an imperfect representation of the long train of various symptoms, which fall under the observation of an experienced practitioner. We are indebted to John Hunter for the invention of that mode of treating aneurism, by the ligature of the artery above the tumour, which is now universally adopted; an operation which has preserved a great number of lives, and which is the more interesting, as it was the result not of any happy accident, but of great knowledge of the animal economy, and of reflection. Yet it would not be difficult to enumerate some practical improvements in the art of treating diseases emanating from other sources, which might well compete with this. That John Hunter was a great observer of disease cannot be doubted. His pathological preparations collected for the purpose of illustrating his Lectures, and his Lectures just now published by Mr. Palmer, afford sufficient evidence of this fact. But in his endeavours to improve the science of his profession, he did not travel by the ordinary road, and he must not be measured by the standard of other men. His object was to analyse the complex processes of disease; to resolve them into their simpler elements; and thus to establish principles applicable to general pathology, and leading, not to the empirical employment of new remedies, but to scientific rules of practice.

Whether we consider the quantity of labour and intellect bestowed upon it, or the influence which it has exercised over the peculiar studies of our profession, and I may add over the lot of human nature, we must regard the treatise on the blood and inflammation as the greatest result of John Hunter's investigations. It was the work of his whole professional life; and, although the doctrines which it contains had been gradually disseminated through the medium of his Lectures and his conversation, such was his anxiety to render it as complete as possible, that he never gave it to the world himself, and it was at last published by his executors. It may be said to afford the first example of the application of the inductive method of philosophy to pathological science; at any rate there was no previous instance of an extensive pathological inquiry having been founded on a long series of practical observations and experiments, and pursued patiently for many successive years. The general accuracy of these researches is proved by this circumstance, that very few of the doctrines which they inculcate have been controverted by later discoveries. The importance of them is universally felt and acknowledged; and, indeed, it seems now difficult to understand how either physicians or surgeons could have entertained any just notions of disease without them.

It is not my intention to enter into a critical analysis of John Hunter's pathological doctrines. I shall, however, venture to call your attention to one circumstance of paramount importance: In describing the phenomena and laws of inflammation, he has also described the natural processes which lead to the reparation of many local injuries, and the cure of many diseases. He has presented to us, in an intelligible form, that which was obscurely portrayed by Cullen under the name of the *vis medicatrix naturæ*; and, by teaching us where we are not to interfere with the ordinary course of events, he has contributed more towards the advancement of the healing art than all the inventors of remedies who had gone before him.

As there are few things more interesting to man than the study of human nature, so is there no part of that study to which our attention can be more profitably directed, than the contemplation of minds like that of John Hunter, which not only give a character to the age in which they exist, but transmit their influence to all succeeding generations. I trust, therefore, that I shall be excused, if, after having taken a brief survey of what John Hunter has done, I proceed to consider the nature of those moral and intellectual qualifications, by means of which he was enabled to accomplish his undertakings.

The first thing which it occurs to me to notice in the character of John Hunter, is his unrivalled perseverance and industry. His life was one of incessant labour. He slept a little after dinner, and four hours were devoted to sleep after midnight; otherwise he was constantly employed in some one of his pursuits. When my friend Mr. Thomas brought him a letter of introduction on his coming as a student to London, Mr. Hunter appointed him to call upon him at five o'clock on an October morning. Mr. Thomas was punctual to his appointment, and found him already busily engaged dissecting an insect under the light of a lamp. Undoubtedly much of this was to be attributed to his physical construction. He could dispense with a portion of that sleep which is indispensable to others. His animal frame enabled him to make exertions which others were incapable of making. But much was to be attributed also to the operation of a vigorous and energetic mind, triumphing over the weakness of the body. For some years before he died, he had laboured under the symptoms of complicated bodily disease, including those of *angina pectoris*, and his sufferings were often severe and alarming. But this, which would have reduced most others to a state of inaction, made little difference to him. His pursuits were scarcely interrupted by it. When Mr. Thomas visited him at five o'clock in the morning, he was in that state in which any sudden and violent emotion of the mind might have endangered his life.

Industry may lead to considerable results when combined with only a moderate portion of talent; but what may it not accomplish when superadded to great sagacity, a spirit of observation, and the power of thinking? John Hunter worked in the acquirement of knowledge; but while he worked, he observed and thought. He had vast powers of reflection. He looked at the thing before him over and over again; viewed it in all its relations to other objects, and in doing so his mind ascended even to the most remote analogies. He not only thought himself, but was, and is, and will still be, the cause of thinking in other men. Accurate as he was in his observations and (with some very rare exceptions) logical in his reasoning, careful to admit nothing as certain which is not justified by the premises, still the indications of a speculative and discursive mind may be found in all his works. Hence it is that we may perceive in them many, and those not doubtful, anticipations of what has been done by modern anatomists and physiologists; in like manner as in the queries at the end of Newton's Optics we find the germs of many late discoveries, of which, at the time, no one but Newton himself had a conception.

That John Hunter was ambitious; that he valued his reputation as a philosopher; that he was not insensible of the stimulus—

> 'which the clear spirit doth raise,
> That last infirmity of noble minds,
> To scorn delights and seek laborious days,'

cannot be doubted. I fear that we must admit even more than this; and that his desire of reputation sometimes amounted to a fault. There was, however, a principle always operating in his mind with much greater force than the desire of reputation, and that was the desire of knowledge. He loved knowledge for its own sake. As I have already mentioned, he went on collecting his observations respecting the vascular system and inflammation, and yet had never published them, when he died at the age of sixty-five years. When I was formerly giving lectures as Professor of this College, I found in a drawer of the museum what appeared to be some pieces of dried sticks. Mr. Clift said that he did not know what they meant, but he was sure that they meant something, and therefore that he had preserved them. When I examined them, I found that they were the result of some interesting experiments in vegetable physiology. It appeared, from one of them, that he had made the first and most important of the experiments made many years afterwards by Mr. Andrew Knight, proving the descent of the sap through the vessels of the bark. Yet these specimens had no ostensible place in the museum; and they would have been swept away as rubbish but for the care of Mr. Clift. He solved the difficult problem of the circulation of the crustaceous animals, which others since his time, and Cuvier among the rest, have endeavoured to solve in vain. These things could not be displayed in preparations: the drawings representing them, with the explanatory notes appended to them, lay concealed in a cabinet; and I doubt whether more than half a dozen persons were acquainted with their existence, until I exhibited them in my Lectures, delivered in this College, in the year 1821. The whole of these observations have been lately published in the printed catalogue of the museum, and have been thus made known to the world at the end of more than forty years from the time of John Hunter's death. It would be easy to multiply examples of this kind. If John Hunter had been influenced by a hankering after reputation more than by a real love of knowledge, he would never have trusted to the chance of posterity doing him justice in these matters.

In making a comparison between the two Hunters, it seems difficult to avoid giving the preeminence to the younger brother; but that preeminence did not belong to him in everything. I have described what William Hunter was as a lecturer; but John Hunter did not excel in this capacity. It was not always easy to comprehend his meaning. William Hunter was a man of learning, and an accomplished writer: John Hunter had no learning, in the common acceptation of the term; he composed with difficulty, and no small effort of attention is sometimes required to enable us to comprehend his ill-arranged and involved sentences. The youngest of ten children, he probably enjoyed the privilege which a younger child not unfrequently obtains, of being indulged, and of being allowed to take his own course when he ought to have been employed in study. It is much to be regretted, that his education should have been thus neglected. If he had been better acquainted with the use of language, it cannot be doubted that more of his observations would have been transmitted to posterity. At all events, his writings would have exercised a more early, and a more extended, influence even in this country. As it is, they are not estimated as they ought to be in foreign countries, simply on account of the difficulty of translating them into other languages. Yet it may be admitted as a question, whether he would have derived any advantage from what is commonly regarded as a highly finished education. One effect of such an education, in ordinary cases, is to give habits of industry, and to increase the power of fixing the attention; but these were qualities which he derived from nature, and no training of the mind in early life could have improved him in this respect. Another effect of education is to correct the judgment, and to give some capability of thinking to those who do not possess it naturally; but in a really great mind, like that of Hunter, judgment and thought, if I may be allowed to use such an expression, are the result of instinct, more powerful than education. If he had become distinguished as a Latin and Greek scholar, an eminent mathematician, a great learner of what has been done by others, it is more than probable that his talent for original observation, and his habit of thinking for himself, would have been impaired; and that he would have been rendered incapable of that concentration of his intellect on one order of subjects, which was absolutely necessary to the success of his investigations.

John Hunter is not the only individual who has contributed to the improvement of the sciences of our profession, for whom we are indebted to William Hunter. Hewson, who was for some time associated with him in his Lectures, partook in no small degree of his master's zeal and industry: and his works show how much may be accomplished by means of these qualities, when infused even into a mind of moderate dimensions. Cruikshank, over-sensitive and hypochondriacal as he was from disease, was much superior to his predecessor Hewson. His physiological papers, published in the 'Philosophical Transactions,' and his 'Treatise on the Absorbent Vessels,' exhibit a combination of genius and learning, and justify us in assigning to him a very high place in the scale of men of science. Baillie, the nephew and the pupil of the Hunters, was justly celebrated as a lecturer on anatomy, and as a scientific and practical physician; and his 'Treatise on the Morbid Anatomy of the Human Body' will be the means of handing his name down to posterity as a great pathologist. Many, who are now present, will bear testimony to those great and good qualities which obtained for him, in an unusual degree, the respect and esteem of his profession: his sagacity, his knowledge, his judgment; his sincerity, his consideration for the feelings of others, and the total want of selfishness, or what may be better expressed by a phrase drawn from another language, the *abandon de soi*, which he exhibited on all occasions. There was another distinguished individual, the last of the school of the Hunters, who was joined with Dr. Baillie in instituting this annual commemoration of his relative and preceptor: and whom I feel myself the more called upon to mention, as I was indebted to him for many acts of kindness in the early part of my professional career, and as I cannot doubt that some circumstances, to which it is painful for me even to allude, and into the consideration of which I certainly do not feel myself called upon to enter, have tended to cast a shade over the merits which he really possessed. I shall endeavour to describe Sir Everard Home, such as he appears to me to have been, when I first became acquainted with him. He was a great practical surgeon. His mind went directly to the leading points of the case before him, disregarding all those minor points by which minds of smaller capacity are perplexed and misled. Hence his views of disease were clear, and such as were easily communicated to his pupils; and his practice was simple and decided. He never shrank from difficulties; but, on the contrary, seemed to have a pleasure in meeting with them, and overcoming them: and I am satisfied that to this one of his qualities many of his patients were indebted for their lives. Much valuable information is to be found in his surgical works, and his observations on ulcers, and those on the diseases of the prostate gland, may be perused with advantage by the best-educated surgeons of modern times. He possessed the art of employing every instant of his time; and could, with perfect ease, transfer his attention at once from one subject to another quite different from it. Hence it was that he was enabled, although engaged in a large private practice, to pursue the study of comparative anatomy to a considerable extent. His earlier papers on this subject, communicated to the Royal Society, are of great and acknowledged value. But, unfortunately for his reputation, his ambition rather increased than diminished, while his mental powers were gradually declining under the influence of an indifferent state of health and increasing years. In his latter days he had an overweening anxiety to appear before the world as a discoverer: and his friends in the council of the Royal Society too readily inserted whatever he offered to them in the Society's Transactions; and the result has been that many of his later communications are of such a nature, that his best friends must now regret that they were ever published.

It would give me pleasure to notice other individuals, who have done honour to our College, and among whom I should find the personal friends of many of us, and my own instructors; but there is not time for me to do what I would wish in this respect; especially as I am bound not to pass over in silence a distinguished member of our profession, of whom death has deprived us since the last Hunterian Oration was delivered by Mr. Lawrence.

Sir William Blizard retained his faculties but little impaired, even when he had entered his ninety-third year: and this and other circumstances combined to render him an object of interest with us all. He stood among us like the remnant of a former age, and we are always to bear this in mind, when we form our estimate of his professional character.

It is not to be supposed that, at his advanced period of life, he could have kept himself on a level with the increasing knowledge of the day; and it is but justice that we should compare him, not with those among whom he died, but with those who were his competitors in the meridian of his life. We find that he then occupied a considerable station in society, and he retained his reputation for so long a time, that we cannot but suppose that it rested on a substantial basis. He possessed extraordinary zeal and energy; unbounded activity in a great degree supplied the place of steady industry, and these qualities mainly contributed to his elevation. Of a sanguine and enthusiastic turn of mind, he carried something like the spirit of chivalry into the sober pursuits of his profession. To this College, especially, he had a kind of romantic attachment, and I have no doubt that he believed that all the world joined with him in his admiration of it:—

> 'Nil oriturum alias, nil ortum tale fatentes.'

It was curious and pleasing to see so much of the simplicity of a boy remaining in the old man, after more than seventy years of incessant occupation in this busy world.

Sir William Blizard was distinguished for a remarkable degree both of physical and of moral intrepidity. Of the former, many examples were well known to his acquaintance; and the whole tenor of his life was a demonstration of the latter. Where he had made up his mind that a certain line of conduct was the proper one for him to pursue (and in this it was with him as it is with most of us, that his judgment was sometimes right and sometimes wrong), nothing could turn him from his purpose. His own private interests never entered into his calculations. Indeed, with respect to these he was careless in an almost extreme degree. Many years ago he lost nearly the whole of the savings derived from his professional labours, by coming forward to assist a near relation who was in embarrassed circumstances; and he never redeemed his fortune to any considerable extent, although he certainly might have done so, if that had been his object, and he had no habits of personal expense to prevent him.

Those who are much advanced in life, generally form a lower estimate of the march of knowledge than those who are younger: and this, I doubt not, is to be attributed in great measure to their knowing less of what has been gained; but it is to be attributed also, in part, to their knowing more of what has been lost; so that to them the march of knowledge does not appear to be altogether an onward movement. Sir William Blizard formed no exception to this general rule. He had a great respect for whatever was ancient; for the outward forms of things, as well as for things themselves. At a meeting of the Court of Examiners, not long before he died, he began his examination of a candidate in the following manner:—'Be so good, Sir, as to explain to me the difference between schindylesis, synarthrosis, diarthrosis, and ginglymus?' The young man hesitated, evidently not comprehending the question, when some one suggested to Sir William, that these terms were not much in use among the modern teachers of anatomy. He shook his head, lamenting, as much in earnest as in joke, the degeneracy of the age.

Those extensive alterations which the increasing size of the library and museum rendered necessary in the structure of the College, are at last completed; and I trust that the greater advantages which we shall now derive from this institution, will afford us a sufficient compensation for the inconvenience which has arisen from the doors of it having been closed during the last three years. The library at this time contains not less than 20,000 volumes, and includes the most valuable works in the various branches of medicine and in general science. Besides being open in the early part of the day as formerly, it will be open on three evenings of the week; an arrangement, which will, as I conclude, be very convenient to those gentlemen who are much engaged in practice.

The walls of the former museum have been elevated, so as to admit of a second gallery; and an additional building having been erected for the purpose of receiving the pathological collection, there will now be an opportunity of displaying many things relating to natural history and comparative anatomy, which were not displayed before. Various osteological specimens which formerly reposed in boxes in the vaults of the College, have already emerged from their obscurity, forming an extensive series of skeletons, and the whole is rendered at the same time more interesting and more intelligible by the *catalogue raisonné* which is now advancing rapidly towards its completion.

The lectures illustrative of the museum, have hitherto been consigned to different members of the College, none of whom have found it convenient to retain the office of professor for more than three or four years; and who, being engaged in other laborious duties, were seldom able to do full justice to the task which they had undertaken. Those lectures will now be delivered by the junior conservator, Mr. Owen, whose zeal and talents are known to you all; and who, devoting himself entirely to anatomy and physiology, will prove, as I venture to predict, a more efficient professor than any of us, who have preceded him. Thus there will be established, by means of this great museum and the lectures, a school of what may be called 'the science of life,' such as has never existed in this metropolis before, and we may reasonably conclude that this will ultimately be productive of great practical results. The wards of the hospital and the dissecting-room will enable the diligent student to obtain an adequate knowledge of what has been already done in surgery, and to become a good practical surgeon; but those who would earn for themselves preeminence, by adding to our stores of knowledge and improving the science of their profession, must carry their views further, contemplating the phenomena and laws of life generally; not as they are exhibited in our own species only, but as they exist in the whole animal creation. If John Hunter had confined himself to a knowledge of human anatomy, however minute, and to mere clinical studies, his treatise on the blood and inflammation could never have existed. I need go no further than this. This indisputable fact is in itself sufficient to convict those of ignorance and error, who hold that medicine and surgery are but empirical arts, and that physiological researches, and scientific views of disease, are of little importance to the practical physician and surgeon.

But these are not the only inducements which I may offer to the junior part of my audience to prosecute these interesting studies. Next to the moral conduct and honourable principles of its members, is there anything which so eminently tends to raise our profession in the estimation of the public, as its connection with philosophical pursuits? Is it not an advantage, in any profession, to have some object which may engage the attention beyond the drudgery of professional practice; to which the mind may turn with delight as a relaxation from severer duties, to which it may retreat as a refuge in the hour of anxiety and disappointment? I would ask, moreover, if there be any department of human knowledge more worthy of the attention of the philosopher? Are there any sciences which offer to us a greater number and diversity of facts, calculated at once to awaken and gratify curiosity, or to excite, in the reflecting mind, feelings of a sublimer nature? Everywhere around us, in the air, in the waters, on the surface, and even in the dark deep caves in the recesses of the earth, we recognise the operation of that mighty principle which animates the universe. We trace it by means of the microscope, where the effects which it produces are imperceptible to our unassisted vision; we lose sight of it only at that point at which the power of lenses will carry us no further; and geology exhibits it to us in the various forms which life assumed in those remote and mysterious ages, which were antecedent to all human history. A boundless field is open to our observation; and whatever part of it we explore, we discover subjects of admiration, not inferior to those which are presented to the astronomer when he looks into the starry heavens. It is in this part of the creation, more than in any other, that we discern the manifestations of the Creator. In the history and structure of individual animals, we find marks of intelligence, power, and benevolence, beyond what our minds can measure; while the uniformity of the design which pervades the whole system, affords an unanswerable argument in favour of the unity of the cause in which it has had its origin.

INTRODUCTORY DISCOURSE

ON THE

STUDIES REQUIRED FOR THE MEDICAL PROFESSION

ADDRESSED TO THE STUDENTS OF ST. GEORGE'S HOSPITAL,

OCTOBER 1, 1838.

THERE are very few departments of human knowledge which may not be cultivated, with more or less advantage, by those who are engaged in the pursuit of the medical profession. The phenomena of muscular action cannot be comprehended by one who has paid no attention to the study of mechanics. Without some acquaintance with the phenomena and laws of light, you will in vain endeavour to understand the physiology of the eye, and the treatment of its diseases. The classification of the various textures of the body; the changes produced in the animal fluids by respiration and secretion; the composition and exhibition of medicines—these things must be altogether mysteries to those who have not applied themselves to chemistry. I cannot believe that anyone is really qualified to undertake the management of cases of mania and imbecility of mind, who has not studied the mind in its natural and healthy state, and endeavoured to analyse his own intellectual and moral faculties. The stores of medical experience accumulated in former ages, and even the comparatively modern works of the great Haller, replete as they are with the most interesting physiological information, are of little avail to those who have no knowledge of the dead languages.

It is not, however, my intention, in this introductory discourse, to enlarge upon these topics. There are some studies peculiar to the medical profession to which, if you would do justice to the public, and obtain honour for yourselves, you must be especially devoted: which you must prosecute, not carelessly, and as a matter of form, but with zeal and unremitting diligence, through the whole period of what is called your education; and some of them also during the remainder of your professional lives. It is to the method of conducting these important studies that I am now anxious to direct your attention. My object is, in the beginning of your professional career, to place you in the right road; and I trust that the observations which I have to offer, founded as they are on experience, and on an earnest desire for your welfare, may not be unacceptable at the present time, nor be found altogether useless in the future.

In the practice of our art we undertake the cure of disease; and, in saying that we are to use our best endeavours, honestly and conscientiously, for the attainment of this object, we describe the entire duties of a medical practitioner. But for the cure of disease it is not sufficient that we should understand the nature and application of remedies; we must study disease itself, in all the variety of forms under which it may present itself to our notice. And this leads us to another order of inquiries. Disease is the derangement of one or more of the animal functions, in many instances attended with an alteration in the structure of the body; and, if you would understand these subjects, you must first make yourselves acquainted with the structure and functions of the body in its healthy state. Thus you will perceive what are the three principal divisions of the course of education in which you are now engaged. The first comprehends the science of Anatomy and Physiology; the second, that of Pathology, or the science of disease; and in the third division we find whatever relates to Medical and Surgical Treatment.

Let it always be borne in mind that this last is the real object which you have in view. I address you as future medical practitioners. If, taking another course, you choose to study Anatomy and Physiology, merely as interesting branches of human knowledge, you are at liberty to do so, and you will be as well rewarded for your labours as if you had applied yourselves to Geology, Optics, or Astronomy. In like manner, if anyone apply himself, as a Philosopher, altogether to the study of Pathology, he will find much in it that may interest himself, and that may be useful afterwards to those who carry their researches further. But as medical practitioners, you must not stop at either one or the other of these points; and, never losing sight of the ultimate object of all your investigations, you must estimate the value of whatever other knowledge you acquire by the degree in which you find it to be directly or indirectly applicable to the healing art.

It is one advantage arising from the peculiar constitution of the London medical schools, that, with few exceptions, the instructions, which you here receive, have, in a greater or less degree, a tendency to practice. The ambition of the teacher of Anatomy is not limited to success in his present vocation. He looks forward to the time when his profession as a Physician or Surgeon will elevate him to fame and fortune. His mind is naturally directed to those inquiries, a proficiency in which will most assist him in the attainment of these objects; and that which is useful to himself cannot fail to be useful to his pupils. I have no doubt that the praises which are bestowed on some of the continental anatomists are well founded: that there are universities in which the Anatomical professors, devoting their whole time, and industry, and intellect, to this one pursuit, explain the mysteries of minute anatomy at greater length, and with more precision, than the teachers here: but, nevertheless, I assert, that ours is the better method with a view to the education of those who wish to become, not mere philosophers, but skilful and useful practitioners.

In like manner, Pathology is not taught here as a separate science, but you receive your instructions in it from the Lecturers on the practice of physic and surgery, who, while they explain the changes of function or structure, which constitute disease, point out also the symptoms by which the existence of these changes is indicated in the living body, and the means to be employed for the patients' relief. Thus while you are taught Pathology, you are taught also its uses and application; and these different subjects, brought under your view at the same time, serve mutually to elucidate each other; for, while Pathology assists you in obtaining a knowledge of symptoms, the study of symptoms, and of the operation of remedies, contributes in no small degree to extend your knowledge of Pathology.

The education of a medical practitioner, for whatever department of the profession he may be designed, necessarily embraces a variety of subjects. But it is extended over a space of at least three years, and it is of great importance that you should so arrange your studies that no excessive and overpowering demand may be made on your attention at any one period. And here let me advise you to begin with a system of steady application, and to adhere to it throughout. It is not uncommon for medical students, any more than it is for other students, to engage at first with zeal in their pursuits; then, as these lose the charm of novelty, to become careless and indifferent, and at last, when their education is drawing to a close, and it becomes a question how far they are qualified to undergo the required examinations, to endeavour to make up for the time which has been misspent and wasted by excessive labour, such as is incompatible with sufficient physical repose and mental relaxation. But it is not in this way that great things are to be accomplished either in our profession, or in any other. Habits of attention which are once lost are not easily regained; and no durable impressions are made upon a mind which is exercised beyond its powers. The slow but persevering tortoise reached the goal before the hare, who was over-confident of the speed which she could exercise if she were required to do so; and this fable, which we were taught in the nursery, conveys a moral lesson which the philosopher need not be ashamed to learn.

The studies which will occupy the principal part of your time are those of Anatomy, and of the Hospital practice; and you cannot doubt as to which of these has the claim of precedency. I will not say that a student who attends the wards of the hospital in the beginning of his education, may not thence obtain some sort of useful practical knowledge; but it is plain that he can profit little by it compared with one whose mind has been prepared by a previous diligent attendance on the anatomical lectures and dissecting-room. The attendance on anatomical lectures is necessary for your initiation into the study of Anatomy. They give you a general view of what you have to learn, and are, at the same time, the source whence you will derive your principal instructions in Physiology. For Anatomy and Physiology are one science, and to teach them separately is about as absurd as it would be to divide Astronomy into two sciences, the one teaching the figure and size of the heavenly bodies, and the other their motions. But to be a good anatomist, the student must labour in the dissecting-room: he must unravel the structures of the human body with his own hands, and examine everything for himself. The impressions which dissection leaves upon his mind not only are accurate, but they will be lasting; if he trusts to those which he receives from the discourses and exhibitions in the lecture room, he will find them to be evanescent.

Such is the connection of the different parts of the animal system, and so dependent are they on each other, that it would be hazardous to regard the knowledge of any one of them as altogether useless. But there are some parts of which a general knowledge is all that is required. It would be an unprofitable waste of time to trace all the artificial divisions which may be made of the deep-seated muscles of the spine, or the varieties which occur in the minute ramifications of the veins and arteries. On the other hand, there are some parts, such as the bones and muscles of the extremities, the distribution of the principal nerves and larger vessels, the structure of the viscera, which cannot be too sedulously and minutely studied; and no one is fitted to undertake the practice of operative Surgery, who is not familiar with the exact relative situation of the parts concerned in surgical operations.

During the first season of your education, you will find that the labour of acquiring a competent knowledge of Anatomy is such that you will have but little time to bestow on other studies. The few among you who have the opportunity of remaining in the schools during a period of five or six years may do well to devote even two entire winters to Anatomy before they begin their attendance on the hospital practice. But I cannot give this advice to the majority of those whom I now address, and whose period of education is more limited. And here let me observe, that it is a great mistake to suppose, after the first anatomical session is over, that it is better for you to defer beginning your attendance on the hospital until the next autumn. You will, in fact, attend the hospital to greater advantage during the summer than at any other time. The same opportunities of experience present themselves at the hospital at one period as at another, and during the summer you can bestow a more undivided attention on what there occurs than you can during the winter.

While engaged in attendance on the hospital, always bear in mind that there is no one of your other studies which, as to real importance, can compete with this. The Lectures on Anatomy, Chemistry, Materia Medica, Practice of Medicine and Surgery, and Midwifery, are nothing in themselves. They are but the means to an end, and are valuable only because without them you would be unable to learn the symptoms and treatment of diseases in the hospital. I feel it my duty to make this observation, and to make it earnestly, because it appears to me that the truth which it inculcates is not, for the most part, sufficiently impressed on the minds of medical students. Perhaps, however, if strict justice were done to all concerned, and we were to trace this mistake to its origin, we should find that it belongs, not so much to the medical students themselves, as to those by whom their course of education is regulated, and who, by a false estimate of the importance of lectures, and an unnecessary multiplication of the number of them which the students are required to attend, have left an altogether insufficient time for a profitable attendance on the hospital.

Indeed, it is not by going through the form of walking round the wards daily with the Physician and Surgeon that you will be enabled to avail yourselves of the opportunities of obtaining knowledge which the hospital affords. You should investigate cases for yourselves; you should converse on them with each other; you should take written notes of them in the morning, which you may transcribe in the evening; and in doing so you should make even what are regarded as the more trifling cases the subject of reflection. Some individuals are more, and others are less, endowed by nature with the power of reflection; but there are none in whom this faculty may not be improved by exercise, and whoever neglects it is unfitted for the medical profession.

You will at once be sensible of the great advantage arising from your written notes of cases. But that advantage is not limited to the period of your education. Hereafter, when these faithful records of your experience have accumulated, you will find them to be an important help in your practice; when years have rolled over you, and the multitude of intervening events has obscured the once bright inscriptions on your memory. Feeling as I do how essential it is, both to yourselves and to the public, that your hospital studies should be well conducted, I shall proceed to offer some further observations on this subject.

In the first instance, your attention should be directed more to the symptoms and progress of diseases than to their treatment. You should begin with those of the simplest form, as the only means of obtaining that elementary knowledge, without which you will in vain endeavour to comprehend the more complicated and difficult cases. Carrying with you into the wards of the hospital the knowledge which you have acquired in the dissecting-room, you will, in each individual case, make these inquiries:—What is the nature of the disease, considering it anatomically and physiologically, and in what organ is it situated, or has it no distinct locality? If these points can be satisfactorily determined, you will, in most instances at least, have discovered the bond of connection between the various symptoms; your subsequent investigation of the case will be rendered more simple; and you will be enabled to form a more distinct and rational notion as to the treatment which is required, and the probability of a cure, than you could have formed otherwise. Do not be satisfied with having learned the structure and functions of the body in health, but attend the examination of those who have died of their complaints; and endeavour to associate the symptoms which existed before death with the morbid appearances observed afterwards. The more extended cultivation of morbid anatomy is one of the most peculiar features of modern times. It has laid the foundation of a more accurate system of pathology than that which existed formerly, and has led to many improvements in practice; and it is right that your minds should be impressed with a just sense of its great value and importance.

Having said thus much, I trust that I shall not be considered as under-estimating these researches in the observations which follow. Morbid anatomy is not pathology, though it is an essential part of it. You may know all that is to be known of the former, and yet your knowledge of the latter may be very limited. To be a pathologist you must study disease in the living body, even more than in the dead. Even in the instance of what we call local diseases, morbid anatomy does not teach us all that we ought to know; but there are many diseases which, as far as we can see, have no absolute locality; and what does it teach us there? In cases of hysteria, gout, fever, and in a number of others which it would be easy to enumerate, the dissection of the dead body furnishes us with little else than negative information; and in some cases, if we trust implicitly to it, morbid anatomy will prove a deceitful guide. Thus, in a patient who has died of continued fever, you find the mucous membrane and glands of the lower portion of the small intestine ulcerated. Your first impression might be that you had discovered the original malady of which the fever was symptomatic. It is only by the investigation of the disease in the living person that you are enabled to satisfy yourselves that the ulcers were the consequence and not the cause of the fever. The mere morbid anatomist may suppose that in the inflammation of the œsophagus and trachea, he has discovered the essence and real seat of hydrophobia; but a more extended observation teaches you that such inflammation is but a contingency; and that whether it exist in a greater or less degree, there will be the same fatal termination of the patient's sufferings. Then there is an extensive class of diseases in which we may say that there is actually no danger; and of these morbid anatomy can teach us nothing, although we may learn much respecting them, so as to understand their nature sufficiently well, by investigating them in other ways. We know as much of a sick headache as of pulmonary consumption; as much of psoriasis and lepra, as of small-pox and measles.

If you were to trust implicitly to what is taught in books and lectures, you would suppose that you must understand the nature of every case that you meet with, and be able to give it its appropriate appellation. But a very little experience in the hospital will teach you that it is not so in reality. No fault is to be attributed to authors and lecturers; for if they were to attempt to teach the science otherwise, they could not teach it at all. But you must take care that you are not misled, and be prepared to meet with cases of which the nature is doubtful, and even with some which are absolutely unintelligible. Never allow your imagination on these occasions to supply the place of knowledge. It is something to be aware of our own ignorance, which time and observation and reflection may remove, but which is likely to be permanent if we think it necessary to offer a hypothetical explanation of every case which we do not, in the first instance, comprehend.

Although, as I have already observed, the symptoms and progress of diseases claim your first attention, yet you will soon discover that these cannot, in practice, be separated altogether from the study of the means to be employed for their relief; and you must, at an early period of your attendance at the hospital, endeavour to form some notion of the principles on which the latter is to be conducted.

The first question, then, which should present itself to you in the management of a particular case is this:—Is the disease one of which the patient may recover, or is it not? There are, indeed, too many cases in which the patient's condition is so manifestly hopeless, that it is impossible for you to overlook it. Let me, however, caution you that you do not, in any instance, arrive too hastily at this conclusion. Our knowledge is not so absolute and certain as to prevent even well-informed persons being occasionally mistaken on this point. This is true, especially with respect to the affections of internal organs. Individuals have been restored to health who were supposed to be dying of disease in the lungs or mesenteric glands. But it is also true, though to a less extent, with respect to diseases of parts which are situated externally. I know females who are now alive and well, who were supposed to labour under malignant disease of the uterus; and I could mention many cases in which patients have recovered of what had been regarded as an incurable disease of a joint. It is a good rule in the practice of our art, as in the common affairs of life, for us to look on the favourable side of the question, as far as we can consistently with reason do so. A sanguine mind tempered by a good judgment is the best for a medical practitioner. Those who from physical causes or habit are of a desponding character will sometimes abandon a patient to a speedy death, whom another would have preserved altogether, or for a considerable time.

There is another inquiry which should be always made before you determine on the adoption of a particular method of treatment. What will happen in this case, if no remedies whatever be employed? If the patient be left altogether to Nature, or to the efforts of his own constitution? There are many diseases, which, for the most part, undergo a spontaneous cure, and we should be always very cautious how, in such cases, we disturb the natural process. A prudent Physician watches a case of measles or small-pox, but it is only on some special occasions that he ventures to have recourse to any active remedies. The Surgeon ought to be influenced by similar views in the management of the cases which come under his care; those, especially, in which the patient suffers from the effects of mechanical injury. The animal system is not like a clock or a steam-engine, which, being broken, you must send to the clock-maker or engineer to mend it; and which cannot be repaired otherwise. The living machine, unlike the works of human invention, has the power of repairing itself; it contains within itself its own engineer, who, for the most part, requires no more than some very slight assistance at our hands. We bring the edges of a wound into contact, but the vascular union, which constitutes the healing by the first intention, is the work of a higher art than any that we profess to practise. If this mode of union fails, and the wound is to be healed by granulations, still this is not accomplished by our means. So, where there is a simple fracture, all that we can do is to place the two ends of the bones in a proper position, and keep them in it. The process by which they are made to unite, so as to be again consolidated into one bone, is not under our dominion and control. These are, it is true, examples of slighter and simpler injury; but even in those in which the injury is more severe and complicated it is easy for us to interfere to the patient's disadvantage, and, in fact, it may be truly said, that there is, on the whole, more harm done by too much than there is by too little interference. A patient with a compound fracture of the leg, or a wound of the knee-joint, stands a comparatively bad chance of recovery, if the Surgeon, in his daily visits, disturbs the position of the limb, introducing his probe into the wounds and sinuses, and dressing them to the bottom with lint. Wounds of the brain are, as you must already know, highly dangerous, so that there is only a small proportion of recoveries among a great number of deaths from these accidents. I was once at the trouble of looking over all the cases of this kind which I could find recorded among my own manuscript notes, and in what might be regarded as standard books belonging to this part of Surgery. I constructed a table, which represented, in every case, the kind of wound, the treatment employed by the Surgeon as far as operations were concerned, and the results which followed; and it was curious to observe how large a proportion of the recoveries occurred in those cases in which the Surgeon either avoided an operation altogether, or confined himself to the removal of some loose and detached pieces of bone. You may well suppose that a person who has a musket-ball lodged in the brain is in a very dangerous condition; nevertheless, it appears that it is safer to allow it to remain, than to endeavour to extract it.

I feel it my duty to give you these cautions. I should, however, be sorry if, in so doing, I were to lead you to over-estimate what Nature can do, or to under-estimate the resources of our art. No one will probably be bold enough to tell you that Surgery is useless; and none but the ignorant will hold this language respecting the sister art of medicine. You will not have been engaged for two months in visiting the bedsides of the patients in the hospital without having ample means of contradicting this absurdity. I said that it is easy to interfere too much in the management of a case of compound fracture: yet the life of a man who has met with such an accident has been frequently preserved by the Surgeon seizing a fit opportunity to open a putrid abscess. I said that a prudent Physician, called to a case of measles, will do little more than watch the progress of the disease where it proceeds favourably; but if symptoms of pneumonia show themselves, and blood-letting is not resorted to at a proper period, the death of the patient may be the consequence of such neglect. When I tell you that we are to trust to Nature, I do not mean to say that we are to confide in her implicitly, but that our rule should be not to disturb her operations without an adequate reason for so doing; at the same time holding ourselves ready, where a just occasion presents itself, to step in to her assistance, and then act with promptness and decision.

You will soon learn that it is not equally easy, in all cases, to determine what is the mode of treatment most calculated to be useful to the patient. The disease may be simple and obvious, so that no doubt can be entertained respecting it; and we know if any remedies, which we possess, are capable of relieving it; and what they are: and, if it be not under the influence of remedies, we know that also. But in another case, the disease may be complicated, the complication being, most usually, of this kind; that that which most attracts our notice is not the primary disease:—but it is against this last, and not against the diseases that follow in its train, that our remedies are to be directed. Bearing this rule in your minds, you will understand many things that occur in the hospital, which you could not have understood otherwise. A patient, for example, has his legs swollen from anasarca; the skin tense, inflamed, and likely to give way and ulcerate, or even threatened with gangrene. We make punctures with a needle: the fluid escapes, the tension is relieved, the inflammation subsides. But the relief is only temporary. The swelling depends on an obstruction to the return of the venous blood from the limb, produced by disease elsewhere, probably at a considerable distance from the part to which our attention has been principally directed. To prevent a recurrence of the mischief in the legs, we must endeavour to remove, or, if that cannot be accomplished, to palliate, the original disease. Another patient suffers from inflammation of the synovial membrane, which lines the knee. The joint is painful, and distended with fluid. Perhaps we are told a history of some sprain; but on inquiry it is evident that the accident was so slight, that it will not account for the symptoms. We have recourse to leeches, blisters, and liniments, and keep the limb in a state of repose: but, although somewhat mitigated, the inflammation still lingers in the joint. In fact, we have not yet traced the disease to its origin. On further inquiry we find that there is a faulty digestion, with flatulence and acidity of the stomach after meals, and a copious secretion of lithate of ammonia by the kidneys. In addition to our other remedies, we administer magnesia, small doses of mercury, and perhaps colchicum, and the disease subsides.

Again, a case, whether simple or complicated, may be obscure; so that we cannot well satisfy ourselves what the symptoms indicate, or how they are linked together. Here we can do nothing better than consider what are, on the whole, the most reasonable explanations which can be offered of the circumstances of it; and without adopting these explanations as realities, our practice must be a series of experiments founded on them. If our first experiment should not succeed, in our second or third we may be more fortunate; and in the meantime, everyone of them probably gives us a clearer insight into the disease, so that we may proceed with more confidence in our treatment of it.

But let us suppose another case. A disease is so obscure, or so beset with difficulties, that we are absolutely at a loss how to treat it, having nothing to direct us in our practice. Here we may apply a rule, which is also applicable to all the concerns of life. When we know not what to do, it is better that we should do nothing. Nature may accomplish something for the patient; and if our efforts to assist her are founded on no principle, they are more likely to be mischievous than they are to be useful.

It is almost proverbial among us—and I have already expressed the same thing, though in other words—that our object should be to seek remedies for the disease, and not for the symptoms. But there are few general rules which are not to be received with some degree of limitation. Particular symptoms may be so urgent, that we must endeavour to relieve them at all events, without reference to the causes which produce them. You must, under certain circumstances, puncture anasarcous legs, although this does nothing for the primary disease. The pain of the tic douloureux is merely a symptom, probably indicating the existence of some kind of disease in the brain: but if the patient be distracted by excessive suffering, are we not to administer opium for his relief?

A physician is called to a patient with a weak and fluttering pulse and cold extremities, who is, to use common language, in danger of sinking. He does not hesitate for one instant to give him ammonia and brandy, without waiting to inquire about the original malady. If the *post-mortem* examination should afterwards disclose that some internal inflammation had been going on at the same time, there is nothing for him to regret; a knowledge of that circumstance, would not have altered his practice in such an emergency as this.

So far the rules of practice seem to be sufficiently intelligible. But the great difficulty remains to be noticed:—How are you to determine what are remedies, and what are not, and the real value of the remedies which you possess? Here is the most abundant source of the errors which infest our art; from which even the most experienced and discerning practitioners are not altogether exempt; but which especially prevail among those who are deficient in experience or good sense. It is to the almost entire ignorance of the public, and especially of the aristocratic classes, as to the evidence which is necessary to establish the efficacy or inefficacy of a particular mode of treatment, that we are to attribute the reputation which is frequently obtained by empirics and other adventurers, who pretend to practise the art without having learned the science of medicine.

When the optician, in constructing an optical instrument, arranges his lenses and reflectors in a new order, his knowledge of the principles of optics enables him to predict the effect which will be produced, so that, except as to some minor circumstances, he can be scarcely said to be making an experiment. But there is no reason to believe that in the study of those varied and complicated phenomena which are the subject of Physiology and Pathology, we shall ever arrive at that point which has been long since attained in optics, and some other branches of Natural Philosophy; and, at all events, we are far distant from it at the present moment. Few greater benefits have been conferred on mankind than that, for which we are indebted to Ambrose Parey

—the application of a ligature to a bleeding artery: but no knowledge which he possessed would have enabled him to say more than that it would be probably successful; and it was left for after ages to demonstrate the principle on which it acts, and to explain the circumstances which may cause its failure. John Hunter, as you will hereafter learn, was led by his knowledge of the animal economy to propose a new method of treating aneurism; and it is impossible to estimate the number of lives which have been preserved by this discovery; yet it was but an experiment, of which even his philosophic mind could not, with certainty, predict the result. It must, however, be admitted that science pointed out the road to these inventions. But this cannot be said of the great majority of the remedies which you will see employed. Nothing that could be known beforehand would lead you to expect that Ipecacuanha would operate as an emetic; or that Opium would occasion sleep; that Quinine or Arsenic would cure the ague; that inflammation of the iris would yield to Mercury; or the gout to Colchicum. The invention of these, and of a multitude of other remedies, is of accidental origin; we are indebted for our knowledge of them, for the most part, to the observations of ignorant persons, accumulated during a long series of ages; and the office of men of science is little else than to study their effects minutely, and to learn the right application of them. But even in doing this, the greatest caution, and, I may say, scepticism is necessary to prevent you being continually guilty of mistakes. I have already told you how many diseases, if left to themselves, admit of a spontaneous cure. We see the surface of the body, and we know by certain outward signs a good deal of what takes place within; but there is much of which we know nothing, so that it is impossible for us to take cognisance of all the circumstances which may occur to modify the course, and alter the termination, of a disease. If we trust implicitly to the instinct which inclines us to believe that when one event follows another, the first is the cause, and the second the effect, we shall be frequently directed wrong. The fact of a patient having recovered under a particular mode of treatment, goes but a little way towards establishing its value; nor is anything sufficient for this purpose, short of the same result being obtained in many similar cases, in which there was otherwise little prospect of recovery. It is the disposition of every one of us to admit the efficacy of the remedies which we employ on insufficient evidence; and unless we, whose duty it is to understand these subjects, are on our guard against this not unnatural prejudice, we have little right to blame the credulity of those whose minds are not turned to these inquiries, when a corresponding error of judgment leads them to believe in the absurdities of metallic tractors, animal magnetism, and homœopathy.

But there are still further considerations, which must not be overlooked in this part of our inquiry. It is not enough that you should have satisfied yourselves, by your own observations, or by those of others, as to the efficacy of a particular remedy in a particular disease: you must look further still; endeavouring to learn what such a remedy may do besides. That which is usually an agent for good, may, under certain circumstances, be an agent for evil also; and as the habits and constitutions of individuals differ, so it is not always in your power to foresee which influence will predominate. Each individual case must be separately and carefully studied, while under treatment, and with a view to its treatment, as much as with a view to a true diagnosis in the first instance. Arsenic is a remedy for *lepra.* Most persons can take it in the doses necessary for the cure of that disease, without experiencing the smallest inconvenience from it: but, in some, a very moderate dose will operate as a poison. Here, by watching its effects, you will always be enabled to discontinue it in time to prevent any ill consequences arising from it; and the fact of it disagreeing with one person, does not therefore prevent you giving it to another. But in other cases, the circumstance of a method of treatment which is generally useful, being occasionally injurious, is a sufficient reason for you to lay it aside altogether. A late eminent surgeon proposed the ligature of the principal vein on the inside of the leg, as a remedy for varicose veins and ulcers of the limb. For some time the operation seemed to be attended with the best results; but ultimately it was ascertained that inflammation of the membrane lining the vein occasionally followed. Such inflammation, when once established, is often uncontrollable, and always highly dangerous; and the possibility of its occurrence is more than sufficient to counterbalance all that can be said in favour of the operation.

I fear that, in my anxiety to give a right direction to those studies, which, as I believe, constitute the most important part of your education, I am already beginning to exceed the brief limits of a lecture. There is, however, one other subject which will not detain you long, and on which, before we part, I feel it my duty to offer a few remarks.

As medical students, you have little leisure for reading; you must, however, be provided with some good systems of Anatomy and Physiology to assist you in the dissecting-room; and you will find some of the best modern compilations relating to medicine and surgery useful when you begin your attendance on the hospital. There are some few books which you ought carefully to peruse. I leave it to the different lecturers to point out what they should be; but I shall take upon myself to mention as one of them the Treatise of John Hunter on the Blood and Inflammation. It is true that the essential parts of John Hunter's doctrines as to inflammation and its consequences are now so incorporated with what is taught in the schools, that to be acquainted with them you need not seek them in his works: but I recommend you, nevertheless, to make these your especial study, for the sake of the other valuable information which they contain, and the important views in Physiology and Pathology which, in almost every page, are offered to your contemplation; and also for this reason, that they will improve your faculty of observation, and furnish you with materials for reflection during the remainder of your lives.

During the latter period of your attendance on the hospital, and afterwards, when first engaged in practice, you should be provided with what may be regarded as the standard works on Pathology, Medicine, and Surgery. Not that I mean much to recommend a course of medical reading, which for practical purposes is nearly useless. Books should be had recourse to chiefly for the purpose of reference, when circumstances have brought a particular subject under your observation. And here I must advise you not to confine yourselves within the narrow bounds of modern publications; an error which is, I fear, too common, at present, not only with medical students, but with practitioners. It is true, that within the last fifty years a vast impulse has been given to our sciences; but it is equally true that they were cultivated not unsuccessfully before. There is no richer mine of surgical knowledge than that which is contained in the memoirs of the French Academy of Surgery; and, as far as I know, there are no descriptions of disease more accurate and graphic than those which have been bequeathed to us by Sydenham.

Gentlemen! Although many years have since elapsed, it seems to me but as yesterday, when I was, as you are now, a young adventurer in this great metropolis; and I well remember how often, in the intervals of my occupations, I have contemplated, with something like dismay, the prospect which lay before me. My own feelings, at that time, explain to me what may possibly be yours at the present period. Yet you have undertaken nothing which energy and perseverance, and upright and honourable conduct, will not enable you to accomplish. It cannot, indeed, be predicated of any individual to what exact extent he may attain professional success, for that must depend partly on his physical powers, partly on the situation in which he is placed, and on other contingencies: but having had no small experience in the history of those who have been medical students, I venture to assert that no one who uses the means proper for the purpose, will fail to succeed sufficiently to gratify a reasonable ambition. You have entered on pursuits of the highest interest, in which you will have the no small satisfaction of knowing that you never acquire any real advantage for yourselves which is not the consequence of your having benefited others. It is true that you have years of constant exertion before you; but you will eventually learn how preferable such a situation is to that of those individuals who, born to what are called the advantages of fortune, but neglecting the duties of their station, believe that they can direct their minds to no more worthy object than the multiplication of their selfish enjoyments. It will not be your lot, as it is often theirs, to suffer the miseries of ennui, or to be satiated and disappointed with life at an early period; nor will you have to regret, as you advance in age, that you have lived unprofitable members of society. It is also true that you will meet with difficulties in your progress;—but there is no higher gratification than that of surmounting difficulties; and in the midst of them you will always be cheered by the anticipation of that period when you may look on past events and say to yourselves—

> 'Multa dies variusque labor mutabilis ævi
> Retulit in melius.'

INTRODUCTORY DISCOURSE

ON THE

DUTIES AND CONDUCT OF MEDICAL STUDENTS AND PRACTITIONERS.

ADDRESSED TO THE STUDENTS OF ST. GEORGE'S HOSPITAL,

OCTOBER 2, 1843.

> ——————πρήξῃς δ' αἰσχρόν ποτε μήτε μετ' ἄλλου,
> Μήτ' ἰδίῃ· πάντων δὲ μάλιστ' αἰσχύνεο σαυτόν.
>
> PYTHAGORÆ *CARM. AUR.*

A LARGE proportion of those whom I now address are assembled, for the first time, for the purpose of pursuing their studies in the Medical School of this Hospital; and their feelings on this occasion are not unknown to me; for, to a great extent at least, they must be such as I myself experienced, when long ago I was situated as they are at the present moment. Transplanted, perhaps, from some small community into this great city; the largest, the most populous, the richest that ever flourished; jostled in crowded streets; surrounded by palaces; where the high-born and the wealthy; where the most eminent statesmen; the most distinguished in literature, in sciences, and arts, and in every other human pursuit, are, as it were, fused into one mass to make the London world: contemplating the novel scene around you, but being not yet identified with it; it cannot be otherwise than that a sense of loneliness should come upon you in the intervals of excitement; that you should say, 'What am I in the midst of so much bustle, activity, and splendour? who will be at the pains to watch the course of a medical student? who will know whether I am diligent or idle, or bear testimony in after years to the correctness or irregularity of my conduct during this brief period of my life?'

But let not your inexperience lead you into so great an error. Even now, when you believe that no one heeds you, many eyes are upon you. Whether you are diligent in your studies; striving to the utmost to obtain a knowledge of your profession; honourable in your dealings with others; conducting yourselves as gentlemen; or whether you are idle and inattentive; offensive in your manners; coarse and careless in your general demeanour; wasting the precious hours, which should be devoted to study, in frivolous and discreditable pursuits; all these things are noted to your ultimate advantage or disadvantage; and in future days you will find that it is not on accidental circumstances, but on the character which you have made as students, that your success as practitioners, and as men engaged in the business of the world, will mainly depend. By the time that you are sufficiently advanced for your lot in life to be finally determined, the course of events will have wrought mighty changes among us. Of those who are now the most conspicuous in station, and the most influential in society, many will have altogether vanished from the scene of their former labours; and others will be to be found only in the retirement of old age. Younger and more active spirits, your own cotemporaries, and those a little older than yourselves, will have occupied their places; and the tribunal, by which you will be judged of hereafter, will be composed of a different order of individuals from those to whose favourable opinion you would at this moment be most anxious to appeal.

But I should be sorry if I were misunderstood as representing this to be the only, or the principal motive, which should lead you to avail yourselves to the utmost of your present opportunities. The knowledge which you will obtain as students, is to be the foundation of the whole of that which many years of professional practice will afford you afterwards; and, if the foundation be insecure, the superstructure will be of little value. However imperfect may be the sciences belonging to the healing art, to bring them even to their present state has been the work of centuries. The industrious student may enter on the active pursuit of his profession with a scanty store of knowledge compared with that of which he will find himself possessed twenty years afterwards; but he is in the direct road to greater knowledge. He has the advantages of principles which have been established by the labours of many preceding generations; and this will render the subsequent efforts of his life comparatively easy. But he who has neglected his education, must, as it were, begin anew; and he will find, when it is too late, that no combination of energy and talent will enable him to rise to the level of those who were, in the beginning, his more diligent competitors. He will, moreover, labour under another and still greater disadvantage. One business of education is to impart knowledge; but another, and still more important one, is to train the intellectual faculties. To acquire the habit of fixing the attention on the object before you; of observing for yourselves; of thinking and reasoning accurately; of distinguishing at once that which is important from that which is trivial; all this must be accomplished in the early part of life, or it will not be accomplished at all: and the same remark is not less applicable to qualities of another order. Integrity and generosity of character; the disposition to sympathise with others; the power of commanding your own temper; of resisting your selfish instincts; and that self-respect, so important in every profession, but especially so in our own profession, which would prevent you from doing in secret what you would not do before all the world; these things are rarely acquired, except by those who have been careful to scrutinise and regulate their own conduct in the very outset of their career.

It cannot be too often brought before you, nor too earnestly impressed upon your minds, that being, in the present stage of your journey through life, in a great degree released from responsibility to others, your responsibility to yourselves is much increased. Your future fortunes are placed in your own hands; you may make them, or mar them, as you please. Those among you, who now labour hard in the acquirement of knowledge, will find that they have laid in a store which will be serviceable to them ever afterwards. They will have the satisfaction of knowing that, in practising their art for their own advantage, they are, at the same time, making themselves useful to their fellow-creatures: when they obtain credit, they will feel that it is not undeserved; and a just self-confidence will support them even in their failures. But for those who take an opposite course, there is prepared a long series of mortifications and disappointments. Younger men will be placed over their heads. Even where their judgment is correct, they will themselves suspect it to be wrong. With them, life will be a succession of tricks and expedients; and if, by any accident, they should find themselves elevated into situations for which they have not been qualified by previous study, they will find that this is to them no good fortune; the world will always compare them with better persons, and the constant anxiety to satisfy others, and to keep themselves from falling, will destroy the comfort of their existence. Whether it be in our profession or any other, I know of no individuals much more to be pitied than those whom fortuitous circumstances have lifted into places, the duties of which they are not well qualified to perform.

I trust that none among you will suspect that these observations are founded on any theoretical view of the subject, or that it is merely as a matter of course that I thus address myself to younger men. I wish to see those who are educated in this Hospital, an institution to which I am indebted for so many advantages which I have possessed in life, go forth into the world useful and respectable members of an honourable and independent profession. I wish to see them obtain success, and worthy of the success which they obtain; and having now had a long experience in the history of medical students, and having been careful to watch their progress through life, I am satisfied that the only method by which this can be accomplished, is that which I have pointed out: and, I may add, that I have never known an individual, who thus applied himself seriously and in earnest to his task, whose exertions were not rewarded by a reasonable quantity of professional success—such as would be sufficient to satisfy any but an inordinate ambition. Beyond this, your lot in life may indeed be influenced by circumstances not altogether under your control. Accident may place one individual in a situation more favourable, and another in a situation less favourable to his advancement. One may have the advantage of greater physical powers, enabling him to undergo the same exertion with less fatigue, and to preserve his energies unimpaired, where those of another would be exhausted; and, in like manner, one may have the advantage of powers of intellect which are denied to his competitors.

With respect, however, to the last-mentioned subject, I have no doubt that the difference is not so great as you, or the world generally, may suppose it to be. There are few persons who have not some talent, which, if properly cultivated, may be turned to good account, and he who is deficient in one kind of talent may excel in another. But the greatest talents may be wasted. They may be blighted by indolence; they may be used for base or improper purposes; or, they may be directed to too great a variety of objects. It is well indeed for you to have some diversity of study, so as to keep all your mental faculties in wholesome exercise; so that you may not be without some sympathies with those around you, and that you may avoid the evils of narrow-mindedness and prejudice: still, whoever would be really useful in the world, and be distinguished in it, must act to a great extent on the principle of concentration, keeping one object especially in view, and making his other pursuits subservient to it. And let no one sit down in despair and say, 'I have not the abilities of my neighbours, and it is needless for me to exert myself in competition with them.' If you would know what your own powers are, you must try to use them. Industry is necessary to their development; and the faculties of the mind, like those of the body, go on improving by cultivation. It is impossible for you to form a right estimate of yourselves in early life, nor can you be rightly estimated by others. The self-sufficient, who do not keep before their eyes an ideal standard of perfection, who compare themselves only with those who are below them, will have an advantage with inexperienced and superficial observers; but I must say that I have never known anyone to do any real good in the world, or obtain ultimately a bright reputation for himself, who did not begin life with a certain portion of humility. The greatest men are humble. Humility leads to the highest distinction, for it leads to self-improvement. It is the only foundation of a just self-confidence. Study your own characters; endeavour to learn, and to supply your own deficiencies; never assume to yourselves qualities which you do not possess; combine all this with energy and activity, and you cannot predicate of yourselves, nor can others predicate of you, at what point you may arrive at last. 'Men,' says M. Guizot, 'are formed morally as they are formed physically. They change every day. Their existence is always undergoing some modification. The Cromwell of 1650 was not the Cromwell of 1640. It is true that there is always a large stock of individuality: the same man still holds on; but how many ideas, how many sentiments, how many inclinations have changed in him! What a number of things he has lost and acquired! Thus, at whatever moment of his life we may look at a man, he is never such as we see him when his course is finished.' These eloquent and philosophical remarks, made by the present Prime Minister of France, are not more applicable to those who are engaged in politics, than they are to those who are engaged in the pursuits of private life, and to none more than to yourselves.

It is not my intention on this occasion to give you any advice as to the detail of your studies. It is best that this should be left to your respective teachers. They will tell you what lectures you should attend first, what afterwards; what hours you should devote to anatomy, what to the hospital practice; where you should take notes, and where you need not do so. There are, however, some general suggestions, which I may venture to offer, without exceeding those bounds to which I wish that my observations should be restricted, and without taking on myself those duties which more properly belong to others.

The first effect usually produced on the mind of a medical student, is that of being bewildered by the number and variety of subjects to which his attention is directed. In one class-room he is instructed in chemistry; in another, in the materia medica. In one place, the structure of the human body is unravelled before him; and in another, he contemplates the interminable varieties of disease, and the methods which are adopted for their cure. He sees none of the relations by which these different investigations are combined together so as to form one science. He has the opportunity of learning a great number of facts, but for the most part they are insulated, and independent of each other; he can reduce them to no order, and the want of a proper arrangement and classification makes the recollection of them difficult and uncertain. But this is not peculiar to medical students. The same difficulty occurs to everyone who enters for the first time on an extensive field of research; and they must indeed be very indolent, and very unfit for the business of life, who suffer themselves to be disheartened by it. Have patience for a while; keep your attention fixed on the matters which are brought before you, and after every lesson that you have received, or at the close of every day, endeavour to recollect what you have seen and heard; and in the course of a short time there will be an end of the confusion; the mist which there was before you will have passed away; where everything had been obscure there will be a clear landscape; and the studies which, when you were first initiated in them, were dry and irksome, will become interesting and agreeable. As you acquire a more extensive knowledge of individual facts, it must necessarily happen that the relations which they bear to each other will become more distinctly developed. This, however, does not seem to be the whole explanation. I cannot well understand what I have observed to happen in myself, without supposing that there is in the human mind a principle of order which operates without the mind itself being at the time conscious of it. You have been occupied with a particular investigation; you have accumulated a large store of facts; but that is all: after an interval of time, and without any further labour, or any addition to your stock of knowledge, you find all the facts which you have learned in their proper places, although you are not sensible of having made any effort for the purpose.

In the commencement of your studies, you will, at first, be altogether occupied in the acquirement of knowledge communicated to you by others. You will learn from lectures and from books what others have learned before you, and what is there taught you must take for granted to be true. A student may be very diligent and industrious, and yet go no farther than this through the whole period of his education. He may become an accomplished person; full of information; a walking cyclopædia; and, at the end of his labours, may obtain the reputation of having passed through his examinations with the greatest credit. All this is as it should be; and those who think that to pass a creditable examination is the only object of their studies, will be quite satisfied with the result. But is it sufficient in reality? Are no qualifications required besides those which are wanted for your examination? It is far otherwise, and no one will rise to be conspicuous in his profession, nor even to be very useful in it, whose ambition is thus limited. The descriptions of disease, and the rules of treatment, are simplified in lectures and in books; and if not so simplified, they could not be taught at all. But you will find hereafter, that disease is infinitely varied; that no two cases exactly, and in all respects, resemble each other, and that there are no exact precedents for the application of remedies. Every case that comes before you must be the subject of special thought and consideration; and, from the very beginning of your practice, although what is taught in lectures and books may render you great assistance, you will be thrown, in no small degree, on your own resources. There is no profession in which it is more essential that those engaged in it should cultivate the talent of observing, thinking, and reasoning for themselves, than it is in ours. The best part of every man's knowledge is that which he has acquired for himself, and which he can, only to a limited extent, communicate to others. You will spend your lives in endeavouring to add to your stores of information; you will, from day to day, obtain a clearer and deeper insight into the phenomena of disease; you will die at last, and three-fourths of your knowledge will die with you; and then others will run the same course. Our sciences are, indeed, progressive; but how much more rapid would their progress be, if all the knowledge that experience gives could be preserved. Now, these remarks are of practical importance to you all. You should begin to act upon them at an early period of your studies. Make out everything relating to the structure of the body for yourselves. Do not altogether trust to what is told you in lectures and books, but make the knowledge your own by your own labours. Observe for yourselves the phenomena of disease, and the only way of doing this in an efficient manner, is to take your own written notes of cases. I say, *your own* notes, for copying those taken by others, as far as the improvement of your own minds goes, is nearly useless; and when you have taken notes in the morning, write them out in the evening, and think of them, and compare them with one another, and converse on them with your fellow-students, and all this will render the investigation of disease a comparatively easy matter afterwards.

In these latter observations, I have anticipated some of those which I had intended to address especially to those among you who are on the point of offering themselves to the public as candidates for practice. It would be a fatal error for you to suppose that you have obtained the whole, or even any large portion of the knowledge which it is necessary for you to possess. You have not done much more than learn the way of learning. The most important part of your education remains—that which you are to give yourselves, and to this there are no limits. Whatever number of years may have passed over your heads, however extended may be your experience, you will find that every day brings with it its own knowledge; you will still have something new to seek, some deficiencies to supply, some errors to be corrected. Whoever is sufficiently vain, or sufficiently idle, to rest contented, at any period of his life, with his present acquirements, will soon be left behind by his more diligent competitors. By the young practitioner, every case that he meets with should be carefully studied; he should look at it on every side; and he should, on all occasions, assist his own inquiries by a reference to his notes of lectures and to books.

But it will rarely happen that, in the beginning of a professional life, even the most diligent and the most successful person will be able to occupy the whole of his time with strictly professional pursuits; and the question must arise, 'What is he to do with his leisure hours?' A most important question indeed it is; for the character and the lot of the individual must depend, in a very great degree, on the way in which such leisure hours are employed. If altogether devoted to what, dull, as they generally are, the world calls amusements, these do but spoil the mind for better things; and if you trust to such desultory occupations as accident may bring, the result will be no better. You will be the victims of melancholy and ennui; an unreasonable despondency with respect to your future prospects will oppress your faculties, and deprive you of that spirit and of those energies which are absolutely necessary to your success. And these evils are easily avoided. How many branches of knowledge there are which, if not directly, are indirectly useful in the study of pathology, medicine, and surgery! and all general knowledge, whether of literature, or of moral or physical science, tends to expand the intellect, and to qualify it better for particular pursuits. There is no excuse for a young professional man, who does not devote some portion of his time to the general cultivation of his mind. His own profession have a right to expect it of him, and he owes it to his own character. Ours is no political profession. It is one belonging altogether to private life. Your place in society depends, not on your being mixed up with parties and factions; not on circumstances external to yourselves, but on your own qualities; you make it for yourselves. You wish, I conclude, to be received in society as being on a footing with well-educated gentlemen. But for this purpose, you must be fitted to associate with them; and this cannot be the case, if you know nothing of those matters which are the general subject of conversation among them. The world care little about those distinctions which, for the sake of a more convenient division of labour, we make among ourselves; and a well-conducted and well-informed man will be just as well received in society if he belongs to one grade of the profession as if he belongs to another. It is very much to the discredit of the great medical institutions in this country, that, except in some few instances, they have not given even an indirect encouragement to the obtaining a good general education, and, in one instance, the legislature have actually done their best to throw an impediment in the way. I know that many, nevertheless, have not been without this advantage; but they may improve themselves still further; and others may, in a great degree, make up for what they have lost by a right disposal of their time in the early part of their practice.

It cannot be difficult for anyone endowed with an ordinary degree of intelligence and curiosity to fill up his vacant hours with pursuits that are no less interesting than useful. But your profession itself, from the moment that you are established as practitioners, will possess a new interest very different from that which belonged to it during the period of your pupilage. Hitherto you have been acting under the direction of others, and on their responsibility. Hereafter, you will have to act for yourselves, and on your own responsibility. Whatever credit is to be obtained, it will be your own; and, on the other hand, where blame is due, you may be sure that no one will volunteer to divide it with you. In every case that comes under your care, you will have to account to your own conscience for having done the very best that it was in your power to do for your patients' welfare: you will have to account also to others; to your own immediate circle of friends and patients; to society at large; to all those whose favourable opinion of your character and conduct is necessary to your success in life. You will find yourselves surrounded by duties, responsibilities, and anxieties which were unknown to you as students. He who has not a full sense of the responsibilities which it involves, is unfit for our profession; and the anxieties of a professional life are but a wholesome stimulus to diligence and exertion. I say this, supposing them to be kept within reasonable bounds. You may allow your thoughts to dwell on subjects of anxiety until an entirely opposite effect is produced, and life is rendered miserable, and the mind enervated. Such a morbid sensibility is as mischievous on the one hand as a want of just sensibility is on the other. You must be careful to train the mind so that it may not fall into either of these extremes. Make every exertion to obtain knowledge, and to use it properly; and then keep it in your recollection that there are bounds to human knowledge and to human powers; and that, in the exercise of our art, we cannot do all that is required of us; for, if we could, pain and misery would be banished from the world, man would be immortal, and the order of the universe would be disturbed. Do not begin life with expecting too much of it. No one can avoid his share of its anxieties and difficulties. You will see persons who seem to enjoy such advantages of birth and fortune, that they can have no difficulties to contend with; and some one of you may be tempted to exclaim, 'How much is their lot to be preferred to mine!' A moderate experience of the world will teach you not to be deceived by these false appearances. They have not your difficulties, but they have their own; and those in whose path no real difficulties are placed, will make difficulties for themselves; or, if they fail to do so, the dullness and monotony of their lives will be more intolerable than any of those difficulties which they may make, or which you find ready made for you. Real difficulties are much to be preferred to those which are artificial or imaginary; for, of the former, the greater part may be overcome by talent and enterprise, while it is quite otherwise with the latter. Then, there is no greater happiness in life than that of surmounting difficulties; and nothing will conduce more than this to improve your intellectual faculties, or to make you satisfied with the situation which you have attained in life, whatever it may be.

To be prepared for difficulties; to meet them in a proper spirit; to make the necessary exertion when they occur; all this is absolutely necessary to your success, whatever your profession or your pursuit in life may be. No one can be useful to others, or obtain real credit for himself, who acts on any other rule of conduct. But it is more easy to lay down the rule than to follow it, unless the mind be disciplined for the purpose from the beginning. The natural tendency of mankind is to indolence; to shrink from difficulties; to try to evade them, rather than to overcome them. Never yield to this disposition on small occasions; and thus you will acquire a habit which will enable you to do what is wanted on great occasions, without any violent or painful effort. It is by neglecting their conduct in the smaller concerns of life, that so large a portion of mankind become unequal to the performance of their higher and more important duties. If you would know a man's character, look at what he does in trifles, and, for the most part, you will be able to form no inaccurate notion of what he would be in greater things.

I have heard the following anecdote of a distinguished individual who afterwards rose to the highest honours of the legal profession. For several years, in the early part of his life, he had been wholly without professional employment. One term went and another came, but that which brought briefs to others brought none to him. Still he was always at his post, and, disappointed but not discouraged, he continued to labour, laying up stores of knowledge for his future use. At last, it happened that he was employed as a junior counsel in a cause of great importance. The evening before the cause was to come on in the court in which he professed to practise, the senior counsel, or (as he is technically called) his leader, was seized with a sudden illness. No one of the same standing could be found to supply his place, and late in the evening the solicitor went, probably unwillingly enough, to the junior counsel, and represented to him under what circumstances he was placed, and that he must trust to him alone. All the hours of the night were devoted to the task. The knowledge which the poor obscure student had acquired now turned to good account. On the following day he gained such credit that his reputation was established, and from this time his elevation was rapid. Now this may perhaps be regarded as an extreme case, but something like it must happen to everyone who attains a high station afterwards. There are few so indolent that they will not make an exertion for the sake of an immediate reward; but it is a poor spirit that can accomplish no more than this. The knowledge which you acquire to-day may not be wanted for the next twenty years. You may devote whole days and nights to study, and at the end of the year may not be aware that you have derived the smallest advantage from it. But you must persevere, nevertheless, and you may do so in the full confidence that the reward will come at last. There is nothing in which the difference between man and man is more conspicuous than it is in this; that one is content to labour for the sake of what he may obtain at a more advanced period of his life, while another thinks that this is too long to wait, and looks only to the immediate result. At first, the former may seem not only to make no greater progress than the latter, but even to be the more stationary of the two. But wait, and you will find a mighty difference at last. You cannot judge from the first success of a professional person what his ultimate success will be; and this observation applies especially to those who contend for the greater prizes, not only in our profession, but in the majority of human pursuits.

A thorough determination to attain an object is the first step towards its attainment. If you wish to advance yourselves in the way of life which you have chosen, you must persevere in one undeviating course, wandering neither to the right nor to the left, or making such excursions as you make into other regions of knowledge subservient to your main pursuit. What is called a life of pleasure is incompatible with a life of business; and those who have a more noble ambition, who love knowledge for its own sake, must learn to limit their ambition, and not waste their talents or their reputation by grasping at too much. Those who would excel in all things, will excel in nothing. They may excite the wonder of the educated and uneducated vulgar; but those who are the best qualified to judge, will detect their weakness, and smile at their superficial acquirements; and, after all their labour, they may die at last, and leave the world no better than it would have been if they had never existed.

And here I can conceive that some among you may say, 'Is there anything which the medical profession can bestow, which will prove a compensation for the labour, the exertion, and the sacrifices which it entails upon us? Is it better to continue in it, or to turn aside to some other pursuit or employment?' Indeed, it is well that this question should be thoroughly considered before it is too late; for, as far as I have seen of the world, nothing is more ruinous than that unsettled state of mind which would lead you, when you are fairly embarked in one profession, to grow dissatisfied with it, and desert it for another. There are, I know, some remarkable instances in which the result was different; but it would be dangerous to quote these as precedents which you might safely follow, or to make the example of a peculiar genius, like that of Erskine, the foundation of a rule for ordinary men.

I know of no profession that is worthy of being pursued, which does not require as much exertion, as much labour, as many sacrifices, as that in which you are engaged; and I also know of none in which he who has the necessary qualifications is more sure of being rewarded for his labours. If it be your ambition to obtain political rank, or to have that sort of reputation which a political life affords, you will be disappointed; for, as I have already observed, our profession has nothing to do with politics. It belongs to private life, and the only other association which it has, is that of science. There are few departments of either physical or moral science with which it is not, in a greater or less degree, connected; and there are some with which the connection is so intimate, that the study of them may be almost regarded as identical. The study of anatomy and physiology is a necessary preliminary to that of pathology; and the former cannot be understood by anyone who has not some knowledge of the laws of mechanics and optics. Animal chemistry is daily becoming more essential to physiology, and is even beginning to illuminate some of the more obscure parts of the science of disease. You are to look, not to political rank, but to the rank of science. No other rank belonged to Newton or Cavendish, to Hunter or Davy; yet their names will live in distant ages; and they will be regarded as benefactors of the human race, when the greater number of their more noisy cotemporaries, if remembered at all, are remembered without respect.

We are informed by his son-in-law and biographer, that, when Mr. Pott was seized with his last illness, he said, 'My lamp is nearly extinguished: I hope that it has burned for the benefit of others.' He addressed himself to his own family, and died on the following day; and, under such circumstances, it would be absurd to suppose that this was said merely with a view to produce an effect, or that these were any but his real and heartfelt sentiments. Undoubtedly it must be a great satisfaction at the close of life, to be able to look back on the years which are passed, and to feel that you have lived, not for yourselves alone, but that you have been useful to others. You may be assured also, that the same feeling is a source of comfort and happiness at any period of life. There is nothing in this world so good as usefulness. It binds your fellow-creatures to you, and you to them: it tends to the improvement of your own character; and it gives you a real importance in society much beyond what any artificial station can bestow. It is a great advantage to you, that the profession in which you are about to enter, if properly pursued, is preeminently useful. It has no other object; and you cannot do good to yourselves, without having done good to others first. Thus it engenders good feelings and habits; and I know of no order in society, who, taken as a whole, are more disinterested, or more ready to perform acts of kindness to others, than the members of the medical profession.

Usefulness is the best foundation of independence. There are some ways of life in which it is common for individuals to obtain unmerited advancement by the patronage of others. But you must be your own patrons. Your knowledge, your skill, your good character, will constitute your fortunes. Your dearest friends will feel that they are not justified in entrusting the lives and comfort of themselves and their families to your care, unless they have reason to believe that it is safe and prudent for them to do so, and that they can do nothing better; and so far, you are no more under an obligation to those who consult you than a landlord is under an obligation to the tenant of his house or land. Those who are well-disposed towards you cannot help you, unless you first help yourselves. But let me not be mistaken. It is well to be conscious that you are to rely on yourselves alone; and that even if you were base enough to cringe and stoop for the purpose of obtaining the favour of others, you could derive no permanent advantage from it. This is the independence which I mean; and not that proud and misanthropical independence which rejects the feeling of all obligations to others. Whoever gives you his good opinion, whatever his station in life may be, is, in some measure, to be considered as conferring an obligation on you, and deserves to be regarded by you with kindness in return. Mankind are bound to each other by mutually receiving and conferring benefits. You cannot live in the world, and, at the same time, live apart from it, and say, 'I will owe no thanks to others; for whatever advantages I may obtain I will be indebted to myself alone.' All those who do justice to your real or supposed merits, have a claim on your gratitude. As others will lean upon you, so you must be content to lean upon them. On no other terms can you form a part of the great community of mankind.

There are some employments which bring those who are engaged in them in contact more especially with the bad qualities of mankind, their pride, their arrogance, their selfishness, their want of principle. It is not so with your profession. All varieties of character will be thrown open to your view; but, nevertheless, you will see on the whole the better side of human nature; much indeed of its weakness, much of its failings, much of what is wrong; but more of what is good, in it. Communicating, as you will probably do, with persons of all conditions, you will be led to estimate others according to their intrinsic qualities, and not according to those circumstances which are external to themselves: you will learn, that of the various classes of which society is composed, no one is preeminently good or preeminently bad; and that the difference is merely this, that the vices and virtues of one class are not exactly the vices and virtues of another. You will have little sympathy with those prejudices which separate different classes from each other; which cause the poor to look with suspicion on the rich, and the rich to look down upon the poor; and while you cannot fail to perceive the great advantages which education gives, you will acknowledge, that to be well educated is not the necessary result of having the opportunity of education; that a bad education is worse than none at all; and that what are called the uneducated classes present many examples, not only of the highest religious and moral principles, but of superior intellect, and of minds stored with valuable knowledge.

All this is good for your own minds; but it is a still greater advantage to you, that a good moral character is not less necessary to your advancement in the medical profession than skill and knowledge. Nor is it merely a strict observance of the higher rules of morality that is required. You must feel and act as gentlemen. I can find no word so expressive of what I mean as this. But let there be no misunderstanding as to who is to be regarded as a gentleman. It is not he who is fashionable in his dress, expensive in his habits, fond of fine equipages, pushing himself into the society of those who are above himself in their worldly station, that is entitled to that appellation. It is he who sympathises with others, and is careful not to hurt their feelings even on trifling occasions; who, in little things as well as in great, observes that simple but comprehensive maxim of our Christian faith, 'Do unto others as you would they should unto you;' who, in his intercourse with society, assumes nothing which does not belong to him, and yet respects himself; this is the kind of gentleman which a medical practitioner should wish to be. Never pretend to know what cannot be known; make no promises which it is not probable that you will be able to fulfil: you will not satisfy everyone at the moment, for many require of our art that which our art cannot bestow; but you may look forward with confidence to the good opinion of the public, which time will bring as your reward, and to act otherwise is to put yourselves on a level with charlatans and quacks.

To obtain such a competency as will place yourselves and your families above the reach of want, and enable you to enjoy such of the comforts and advantages of life as usually fall to the lot of persons in the same station with yourselves, is, undoubtedly, one of your first duties, and one of the principal objects to which your attention should be directed: but, nevertheless, let it never be forgotten that this forms but a part, and a small part, of professional success. If, indeed, money were the only object of life; if to enjoy the respect of others, and the approbation of your own conscience; to feel that you are doing some good in the world, and that your names will be held in esteem when you are gone out of it; if these things were to form no part of your ambition, then, indeed, you might possibly have your ambition gratified by pursuing a different course from that which I have pointed out. You might be unscrupulous in your promises; undertaking to heal the incurable; making much of trifling complaints for your own profit; claiming credit where none belongs to you; and you might try to advance yourselves by what is often called a knowledge of mankind, or a knowledge of human nature. But how is that term misapplied! Knowledge of human nature indeed! This is the most difficult, the most interesting, the most useful science in which the mind of man can be engaged. Shakspeare knew human nature, as it were, by instinct. It has been the favourite study of the greatest men, of Bacon, of Addison, of Johnson. But of those who are commonly spoken of in the world as knowing human nature, the majority are merely cunning men, who have a keen perception of the weak points of other men's characters, and thus know how to turn the failings of those who probably are superior to themselves in intellect, to their own account.

Generous feelings belong to youth, and I cannot suppose that there is a single individual present, who would not turn away with disgust from any advantages which were to be obtained by such means as these. Your future experience of the world, if you use it properly, will but confirm you in these sentiments; for you will discover that of those who strive to elevate themselves by unworthy artifices, it is only a very small proportion who obtain even that to which they are contented to aspire; and that the great majority are altogether disappointed, living to be the contempt of others, and especially so of their own profession, and, for the most part, ending their days in wretchedness and poverty.

There is only one other subject to which, in concluding this address, I think it right to claim your attention. You have duties to perform among yourselves, one to another. There is no one among us who does not exercise an influence, to a greater or less extent, over those with whom he associates, while he is influenced by them in return. In whatever orbit a man moves, he carries others with him. If the vicious have their followers, those who set a bright example of honour and integrity have their followers also. In like manner, industry in one leads to industry in another, and the mind which is imbued with the love of knowledge cannot fail to communicate some portion of that holy inspiration to the minds of others. These, which are among the higher responsibilities of life, have begun with you already. The course which you individually may pursue, does not concern yourselves alone. While you are making your own characters, you will help to make the characters of others. Let this consideration be ever present to your thoughts. It will give you an increased interest in life. It will extend your sympathies with those around you;

and it will afford you an additional stimulus to persevere in those honourable exertions, for which you will, at no great distance of time, be rewarded by the respect of the world, and the esteem of your own profession.

INTRODUCTORY DISCOURSE

ON THE MODE OF

INVESTIGATING THE SCIENCES BELONGING TO THE MEDICAL PROFESSION.

ADDRESSED TO THE STUDENTS OF ST. GEORGE'S HOSPITAL,

OCTOBER 1, 1846.

There is no situation in life which has not its disadvantages to counterbalance whatever advantages it offers to those by whom it is occupied; and the question is, not whether it be without one or the other, but which of these predominates. For those whose lot in life is already cast, it is well that they should look chiefly on the bright side of the picture. In doing so they will be the most happy in themselves, and most useful to others; and they will suffer little from efforts and exertions, which would be otherwise painful and oppressive. But with you, who are beginning your career, the case is different. Your lot is not irrevocably determined. You have your choice to go forward, or to retreat, before yourselves and your families are put to the expense of your professional education. It is not unreasonable for you to inquire into the bad as well as the good: nor shall I, as your friend and adviser, be going out of my way, if, in this introductory address, while I point out the inducements which you have to proceed further, I also take notice of the principal objections which may be made to the profession into which you are about to enter, and the difficulties which may obstruct your progress in it.

Do not, then, flatter yourselves with the belief that, in engaging in any department of the medical profession, your way will lie all smooth before you. If you are unsuccessful you will be disappointed, and will regret that you had not embarked in some other pursuit. But, to be successful, you must make up your minds to a life of labour, of incessant occupation of mind and body. You will never be able to say, 'the next day, or even the next few hours, will be my own;' for the claims on your attention may occur at any time, and often will occur where it seems that you have the least reason to expect them. You never can be off your guard. Then, to the anxiety which you will experience in common with everyone who looks to his own exertions for his advancement in the world, you will have superadded another, and a higher kind of anxiety, such as everyone must, or ought to feel, who is responsible for the health and lives of others, involving, as often happens, the comfort, the happiness, and the worldly prosperity of families. Unlike some other pursuits, the medical profession offers you no political honours or distinctions. It is one essentially belonging to private life; and you will neither share the acclamation of the *profanum vulgus* with the demagogue, nor be elevated to the peerage as the reward of real services to the state, or as the price of your faithful adhesion to a minister. In the practice of your art you will necessarily be called on to witness much that is disagreeable and painful to behold; you will be present at scenes of woe, of mental distress, of bodily suffering: you will be brought into contact with human misery in various, and in some of its most aggravated, forms.

It is not improbable that some of you may, at this moment, be saying within yourselves, 'Can there be anything to compensate for so great a sacrifice, as all this seems to imply, of leisure, of comfort, and of feeling? Will it not be better at once to turn aside into some other walk of life?' Any such conclusion, however, would be, without some further consideration, premature. If you inquire of those who are engaged in other professions, you will not be long in discovering that there is no one of them which has not its difficulties and disadvantages as well as yours; and moreover, you will eventually learn that some of what the ignorant and thoughtless call disadvantages, are in reality no disadvantages at all. There is no pursuit that is worthy of a man of intellect, the objects of which are attainable without labour, and thought, and self-denial. But is this a hardship? It is far otherwise. A very few years of experience in the world will satisfy you that no one is less happy than the individual who, having nothing to study or attend to but the gratification of his own desires, says in the morning, 'What shall I do to-day?' To be cheerful and happy, you must be employed. Each day must bring its own occupation with it, something that you feel it to be, or make it, your duty to attend to; and not only that, it must be something that is useful at the time, or calculated to be useful ultimately. Whatever they may pretend, no one, whose intellect is not of the lowest order, can really be satisfied with himself, if he be not in some way or another usefully employed. Mankind may be, and are, vain or proud, as the case may be, of their personal appearance, their wealth, their rank, their genealogies; and I will not say that the desire of these distinctions, whatever may be their value in the eyes of a philosopher, has not been a useful instrument in the civilising of nations. But such sentiments begin and end with the individual; and even when gratified to the full extent, as the means of happiness, bear no comparison with that self-respect which you will all have a right to feel if you contribute, in your several stations, and to the best of your abilities, to the improvement of the condition of your fellow-creatures. In this respect your profession possesses an advantage over the majority of others, for it has no other object than that of relieving human misery; and to those among you who are fortunately able by your observations and researches to advance the sciences belonging to the healing art, it will be no small consolation, as you approach the end of your career, to know that the results of your labours will not perish with yourselves, but will remain to be a benefit to future generations.

The usefulness of your profession is the best guarantee of its independence. If it be properly pursued, there is no situation in life superior in this respect to that which you will occupy. It is true that you will depend upon the good opinion of the public. This, however, is not only no hardship, but is the very best thing for your own moral character; and you may be assured that, while you perform your duty towards them, they will maintain you above the influence of individual caprice. If political rank form no part of the reward you may expect to reap, it is simply because you have chosen the path, not of politics but of science. Among those who have preceded you in it, and in our own particular department, we find some of the brightest ornaments of British history; and I will not do you the injustice of supposing that there is anyone among you who would not prefer the reputation of Harvey or the Hunters to that of nineteen-twentieths of the courtiers and politicians of the periods in which they lived. Always bear in mind, that your profession is founded on the most important science to which the mind of man can be directed, the science whose office it is to analyse not only the physical, but also the moral, structure of man himself; and that this includes within its domain some portion of almost every other department of human knowledge. Next to its usefulness, it is this close connection of our profession with philosophy which constitutes its chief dignity and excellence; elevating it from the rank of a trade into that of a noble and liberal pursuit. It is only by the scientific cultivation of it that we can expect to arrive at any considerable improvement of our art; and it is by such means only that studies, which would be otherwise disagreeable and painful, can be rendered agreeable and interesting.

From the preceding observations you will have learned that I wish you to understand, that the value of the profession into which you propose to enter will depend mainly on yourselves. If you are prepared to make the necessary sacrifices, and devote yourselves seriously and thoroughly to the pursuit, you will be sufficiently rewarded for your exertions; but if you embark in it on any other terms, your lives will be but a series of regrets and mortifications.

On former occasions,* and in the theatre in which we are now assembled, I have called the attention of those who were then present to various subjects connected with the study and practice of the medical profession; explaining generally the objects to be kept in view, and referring to various points which I believed to be important in relation to the general conduct, and moral discipline, of medical students and practitioners. Although I now address a different audience, I shall not repeat observations which I then made; they are gone forth to the world in various forms, and those who think it worth their while to become acquainted with them cannot fail to have the opportunity of being so. In the remaining part of the present discourse I propose to offer another subject to your consideration, endeavouring to explain, in a more precise manner than formerly, the nature of the investigations on which you are about to enter, the kind of knowledge which you may expect to acquire, and the various sources of error by which, if you proceed without due circumspection, you may be misled, as others have been misled before you.

The sciences belonging to the medical profession relate to matters of fact, to things as they exist in nature, and the changes which they undergo, for which no reason can be given except that so it is, and that such is the will of the Creator. The foundation of them is the same as that of the other physical sciences. The first requisite in such investigations is therefore the habit of minute and accurate observation. The mathematician sitting in his closet, without any reference to what goes on in the world around him, may imagine curves which perhaps never existed in reality; and may reason on them, and determine their properties with the most perfect accuracy. In like manner the moralist may imagine situations, in which a human being has never yet been placed, and determine very correctly what, as a moral agent, he ought or ought not to do on such occasions. But these inquiries are wholly different from ours; and it cannot be too strongly impressed on your minds, that any process of reasoning which lifts you above real objects, and the relations which they bear to each other, is good for nothing. This is so plain a matter that it might seem unnecessary for me to make any kind of allusion to it; yet there are many persons who, though they would at once assent to the proposition when stated in the abstract, seem in practice to lose sight of it altogether. 'I am accustomed to reason, and I cannot help reasoning, about my complaints.' This was said to me by an eminent mathematician, whose knowledge of his case consisted of three or four symptoms, as to the exact cause of which I was myself in doubt. I need not tell you what was the value of his conclusions. Among those who do not belong to the medical profession, this kind of error is of constant occurrence. But it is not peculiar to them; it pervades medical literature to a very great extent. A large proportion of books which have been published (and I do not allude merely to those of the present day), pretending to illustrate diseases and their treatment, were written by those who had nothing beyond the most limited experience and knowledge of the subject of which they proposed to treat. They begin with a few acknowledged facts, assume or imagine others, heap on them a quantity of words having the outward form of reasoning and argument, and thus arrive at conclusions for which a more extended experience would show that there is no foundation.

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* See pages 465 and 485.

Anatomy is a science of simple observation. You use your sight and touch for the purpose of examining the object which is before you. If in minute anatomical researches you have recourse to the microscope, still it is the same thing; this is but another mode of using the sight. In physiology you may place the object under new circumstances, you may make it the subject of experiment; the sphere of experiment, however, being much more limited than in chemistry and some other branches of natural philosophy. In the study of disease, you rely, as in that of anatomy, on observation only; but you have two sources of knowledge, the living body and the dead. In the study of remedies, your observation is assisted by experiment to a very great extent, and in many instances is founded on experiment altogether.

Now whether the thing to be observed be what is presented to you in the ordinary course of events, or whether it be the result of experiment, you cannot be too minute and accurate in your observations; and from the beginning you should train your minds accordingly. The power of observing is undoubtedly different in different individuals; but those who observe easily, are liable to have the faculty impaired by neglect, and in others it may be improved by cultivation. Never forget that a medical practitioner who is not a correct observer is good for nothing. Examine whatever comes before you as students in whatever way it admits of being examined, and as minutely as possible. You do not know at first what is important and what is not, and therefore you should endeavour to overlook nothing, until you are taught this by experience. Long habit, combined with an extensive knowledge of your subject, can alone give you the power of observing accurately and rapidly at the same time. If you attempt in the beginning to imitate persons of greater experience in this respect, your observations will be, not rapid, but hasty, and not of the smallest value.

In observing objects you will necessarily be led to compare them with each other, and perceive in what respects they agree or differ; and this leads, as a matter of course, to some kind of arrangement and classification. The intellectual process in this case is different from the inductive method, by which you deduce those general rules, which we call the laws of nature, from the observation of phenomena. In the latter case you ascend from particular instances to the general rule; but in the former you begin with the general, and descend to the particular. To one who has nothing to do with sheep, one sheep is just like another; but a dealer in sheep distinguishes between the different breeds, and a shepherd distinguishes each individual of his flock. In the dissection of the dead body you discover two membranous tubes or vessels, containing blood. You call them both blood-vessels. But, on further examination, you find that one of them is composed of very thin membranes, and that it collapses on being cut across; while the coats of the other are considerably thicker, containing a good deal of fibrous structure, and the vessel, when cut across, instead of collapsing, remains patulous; and thus, even if you were told nothing about them, and without having the smallest knowledge of their functions, you could distinguish arteries and veins from each other. In like manner, when you first feel the pulse at the wrist, you find one pulse to be like another. It is something beating under your finger; a pulse, and that is all. By-and-bye, you discover that the pulse varies in frequency. In one patient ill of a fever it beats 140 times; while in another, with a disease in the brain, it may beat no more than 40 times in a minute. All this is easy enough, for you can ascertain it by a watch. As your finger becomes more experienced, a close attention to the impression given to it enables you to distinguish a hard pulse from a soft one; a full pulse from one that is contracted; and at last you recognise still more minute differences, such as cannot be explained in words, though the recognition of them may lead to important results in practice. In like manner one ulcer at first is like another. By-and-bye you detect differences of colour and of surface, and a different appearance of their margins, of which you took no cognisance before; and, almost without being aware that you are doing so, you make some sort of classification of them in your own minds. It may not be a very good classification, and certainly it will not be that to which a more extended knowledge of disease will lead you ultimately; but nevertheless, imperfect as it is, it is convenient, and answers a useful purpose at the time.

The principal thing required for accurate observation is a close attention to the thing before you; and this involves no small effort of mind, if you do not feel an interest in it. I may, however, take this opportunity of observing, that I do not measure the probability of a student's ultimate success by the amount of interest, or the facility of bestowing his attention, which he displays in the first instance; for there are many who are captivated by novelty, and cease to feel an interest in their pursuit as soon as the novelty of it is passed away. Let no one despair, because, in the beginning, he seems to feel less interest in his studies, and finds it more irksome to exercise the necessary effort of attention than some others. Let him strive to do his best, and not only will the power of attention come at last, but he will create for himself an interest in things that were uninteresting before. I know that it often happens that a young man is brought up to a particular profession, because it is supposed that he has an especial liking for it, or a *particular turn that way*. Now I do not say that this goes for nothing, and I have no doubt that one structure of mind may, on the whole, be better adapted for one pursuit, and another for another. But I also know that, in many instances, there is nothing beyond a mere love of novelty; and I have very much more confidence in those who enter a profession after due thought and reflection, with a strong determination that, having done so, they will not fail from want of attention, and that they will create for themselves a feeling of interest in it.

The importance of acquiring a habit of accurate observation cannot be too strongly impressed on your minds. The knowledge, however, which is thus obtained does not deserve the name of science, though there can be no real science, no true philosophy, without it. Whatever is the subject of observation leads to the inference of something beyond it: it informs you of another fact, or a whole series of facts. Comparing the phenomena which you have observed with each other, you perceive in what respects they are alike, and in what they differ, and you arrange them accordingly—and thus it is that you arrive at these general rules, which, as I have before remarked, we call the laws of nature. This is the method of research to which the name of *inductive* has been given by logicians. There is nothing in it mysterious or difficult; and although you may not have analysed the process in your own minds, you do not require logicians to instruct you in it. Your own instinct is sufficient. 'It is evident,' says Dugald Stewart, 'that the ultimate object which the philosopher aims at in his researches is precisely the same as that which every man of plain understanding, however uneducated, has in view when he remarks the events which fall under his observation, in order to obtain rules for the future regulation of his conduct.' *

In the prosecution of your anatomical researches, you discover certain structures which must act as valves at the commencement of the two principal arteries of the body, in the heart, and in many of the veins. You observe that these valves all open in one direction, and from these premises, when you come to consider the functions of these parts, you are led to believe that the current of the blood takes a particular course, and that it can flow in no other. Then, you perceive that the blood in some of the vessels of the living person is of a dark, and in others of a scarlet colour; and also, that when the dark-coloured blood drawn from a vein in the arm is exposed to the air it become scarlet, and this justifies the suspicion, that the change from the one colour to the other is somehow produced by the contact of the air in the living person. Still it is only a suspicion, for it may be that a similar change is produced in other ways. By-and-bye, however, you ascertain that fresh air is being constantly drawn into, and then expelled from, the lungs; that the blood in the pulmonary artery is of a dark, and that in the pulmonary veins of a scarlet colour; and lastly, that the air which passes out of the lungs has undergone a change differing in its chemical composition from what it was when it entered that viscus—and all these facts, viewed in combination with each other, convert what was before a well-founded suspicion into as absolute a certainty as can be attained in any investigation of the kind. Having advanced so far, you see a person naturally of a florid complexion, with his cheeks and lips of a dark purple hue, and from this simple fact you infer that the blood is not influenced by the air as under ordinary circumstances, and that this depends probably on some defect in the respiration. But you can arrive at no more particular conclusion, and further inquiries are necessary before you can determine whether the respiration be obstructed by an enlargement of the tonsils, or swelling of the mucous membrane of the glottis, or in any other way.

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* Moral Philosophy, vol. ii. chap. iv. sect. 1.

Let us take another example. A person who has not had the small-pox is in the same room with another who is labouring under that disease. After a certain lapse of time he is indisposed —he is hot, and complains of headache and lassitude, and his pulse is more frequent than it should be; in other words, he is feverish. Then an eruption of small-pox pustules appears over his whole person, and immediately the other symptoms are in a great degree relieved. Still some fever remains, which, perhaps, increases some time afterwards, but at last subsides as the eruption dies away. These various symptoms follow each other so immediately, that even if we were to witness only a single case of the kind, we should be justified in regarding them as probably depending on one and the same cause, and as constituting different stages of the same disease. But finding the same course of events in a second case, and a third, and so on, we entertain no doubt on the subject. A close observation of the symptoms and changes which take place enables us to give what is called a history of the disease, and our belief in the uniformity of the operations of nature (from whatever cause it may be derived) justifies our expectation that the history drawn from the past will apply to the future, and is a useful guide to those who are to come after us, as well as to ourselves.

But the connection between the visit to the sick man's chamber and the appearance of the small-pox afterwards, is not established by a single case, nor even by two or three cases. Many more such facts are necessary to prove that there was anything more than a mere coincidence; for if the small-pox were to arise independently of contagion, such coincidences would undoubtedly occur, and, accordingly, it is worthy of notice, that although the multiplication of evidence has established the fact of the small-pox being propagated solely by contagion, for a long time after the disease first showed itself there was no suspicion of its contagious character.

All this is substantial knowledge, for it consists of the observation and generalisation of phenomena, and of nothing more. But the inquiring mind of the pathologist would naturally wish to know more. What is the nature of the contagious principle? Is it disseminated through the atmosphere as a gas, or does it belong to the class of imponderable agents? Is it a modification of the principle of electricity or magnetism? Does it act through the medium of the skin, or of the lungs? On the blood, or on the brain, or on both? On these points we have no sufficient data to enable us to form an opinion. The only fact that we really know is, that the virus or poison is contained in the fluid of the pustules, for by means of this it may be communicated by inoculation. Other researches, to which I need merely allude at present, show that all the secretions are furnished by the circulating blood, and we have a right to conclude that so it is with respect to the fluid of the variolous pustules; and, indeed, we cannot suppose it to have any other origin. This leads us to a further speculation. There is much fever in the beginning of the small-pox, which is relieved on the appearance of the eruptions. May not this be explained on the supposition, that there is a generation and accumulation of the virus in the blood, the abatement of the symptoms being the consequence of the expulsion of it in the form of pustules? The glanders in horses is a contagious disease, communicable by inoculation to the human subject. The late Professor Coleman informed me of the following experiment. He took a large quantity of blood from a sound horse, so as to occasion syncope, and then transfused into one of his larger veins the blood of a glandered horse. The result was, that the horse which had been sound became affected with the glanders. Viewing these various facts in connection with each other, we find a strong body of evidence in favour of the humoral pathology as applied to small-pox and other contagious diseases. Still it would be bad philosophy to admit it as amounting to more than a strong presumption; for all the phenomena admit of some other explanation, and in experimental physiology the disturbing influences are so great that we are scarcely ever justified in adopting a conclusion on the authority of a single experiment.

With a view to the further illustration of the subject before us (my object being to impress on your mind the necessity of caution in conducting these inquiries), I may advert to another point connected with the history of the small-pox. An individual who has recovered from that disease falls into the society of one who is covered with the small-pox pustules, but he is not affected with the disease in consequence. This may be accidental, for all persons are not equally liable to receive the infection. But it happens again and again, and persons without number, who have had the small-pox, are exposed to the influence of the contagion with the same negative result; so that we have a right to lay it down as a rule or a law of nature, that the small-pox will not affect the same individual a second time. By-and-bye, we make the same observation as to measles, and some other contagious diseases. But we can generalise no further. We presume that the small-pox and measles cause some change in the organisation of the body which prevents it from being affected by the contagion a second time, but as to what that change is we are wholly ignorant, and it is probable that we shall ever remain so, it being of too minute and too refined a character for our senses to be able to detect it. We may suggest various explanations, but they would be purely hypothetical, such as can either be proved or disproved, and to indulge ourselves in discussions of this kind would be mere waste of time and intellect.

To the careful student of disease, that which now exists reveals much of that which existed formerly, and much of that which will exist in future. It also informs him of many things which exist at the present time, though beyond the sphere of his actual observation. A pain in the temple, and a *ptosis*, or dropping of the upper eyelid, show that there is some kind of disease within the cranium in the situation of the nerve of the third pair. If these be the only symptoms, we are compelled to confess our ignorance as to the exact nature of the disease; but if, after an injury of the head, such symptoms exist in combination with fever, delirium, and occasional rigors, we are justified in believing that suppuration has taken place in the neighbourhood of the above-mentioned nerve, this being a reasonable hypothesis, the truth of which has received ample confirmation from the examination after death of other similar cases.

A swollen state of the lower limb, with a varicose condition of the veins of the leg, shows that, at some former period, there has been inflammation, causing obstruction of the femoral, or at any rate of the saphena vein; and in the scirrhous enlargement of the mammary gland, with a thickened and brawny condition of the skin over it, we read the melancholy history of the termination of the patient's life at some future period by the effusion of serum into the cavity of the chest.

This natural vaticination (to use the expression of Bishop Berkeley), in all departments of knowledge, is founded solely on experience; and whoever ventures beyond the limits of his experience will soon prove himself a false prophet. If correct in his opinions, he can be so only by accident, and though what is called a *lucky hit* may sometimes gain him great credit where he deserves none, he will be absurd and ridiculous in the end. And let it be always borne in mind, that, even with all our caution in the prosecution of our sciences, there are difficulties in the way beyond what are met with in that of almost any other, arising from their greater complication. The astronomer, directing his attention to simple laws by which great masses of matter are influenced, is enabled to make the phenomena which he observes the subject of mathematical calculation. The chemist has to deal with a greater variety of phenomena, and with the chemical laws, in addition to the mechanical laws, of matter; and in the facts which are the subject of inquiry with the physiologist and pathologist, we recognise the operation not only of mechanical and chemical laws, but also of those peculiar laws which are connected with the principle of life, whatever that may be. We have no right to believe that the time will ever arrive when we shall be able to apply mathematical reasoning to the phenomena of the living body, either in health or in disease, except in a few instances, and to a very limited extent. With us the subjects of inquiry are probabilities and not absolute certainties. It is true that there are probabilities, so great that we are justified in acting on them as certainties; but below them are all grades of minor probabilities, down to that which is so small that it should be wholly disregarded: and in our pursuits, as in the common affairs of life, it is the power of calculating probabilities at the same time readily and accurately that constitutes what is called a *man of sound judgment.*

Under the name of *therapeutics* we include whatever belongs to the remedial treatment of diseases, including surgical operations, medicines administered internally, local applications, change of air and climate, and other things which it is needless to enumerate. In this part of our investigations we possess this advantage, that we may, to a very great extent, conduct it experimentally. There is, however, a source of error which, perhaps, more than counterbalances this advantage; namely, the difficulty of distinguishing between the effects of the remedies which we have recourse to for the cure of a disease, and the course which the disease would naturally take without our interference; and this difficulty can be met only by a multiplication of experiments and observations. The study of therapeutics cannot be separated from that of disease, and there are very few observations which I offered relating to the latter subject which are not also applicable to the former. In a f instances we may be led to the invention of a new remedy by the application of principles already known. Mr. Hunter was aware that a popliteal aneurism gradually became distended, until it burst, in consequence of the blood being probably impelled into it by the action of the heart. He also knew that, by the application of a ligature to an artery, the vessel becomes obliterated at the part to which the ligature is applied; and he perceived in the smaller arterial branches such communications or anastomoses as must be sufficient to nourish the lower part of the limb, although the passage of the blood through the main arterial trunk was interrupted; and, having all this previous knowledge, he was led to the performance of the operation for aneurism, which is now practised with so much success in every part of the civilised world. In other, and indeed in the great majority of instances, the discovery of a remedy, and the application of it to a particular disease, is altogether accidental; but the remedy having been once discovered, we are often enabled to extend the use of it from one disease to another. For example: no one could have pronounced beforehand that the bark of the cinchona would afford a cure for intermittent fever; but this having been once ascertained, the exhibition of it in cases of intermittent neuralgia, and some other intermittent diseases, became a reasonable, and has proved to be a successful, experiment.

I conclude that you will find all this to be sufficiently plain, and that you cannot fail to perceive that the rules to be observed in the acquisition of medical knowledge are in nowise different from those by which you are directed in other scientific investigations, and even in the common affairs of life. How, then, does it happen, that among those who are engaged in these inquiries there should be so much difference of opinion, and that on many points there should be such various doctrines, having their respective supporters and advocates? I have already adverted to the difficulty arising from the circumstance of the laws which regulate the ordinary phenomena of matter being complicated with another set of laws peculiar to beings that are endowed with life. Another source of difficulty is, that a large proportion of the changes which are constantly going on in the interior of the living body can never be subjected to the actual observation of the senses. There is still another impediment to the advancement of these sciences, namely, that, owing to their greater extent and complication, they include a greater number and variety of phenomena than any other, so that it is scarcely possible that the whole of them should be within the grasp of even the most comprehensive mind. Nevertheless, and in spite of these impediments, by a proper mode of investigation, we may obtain a large store of interesting and useful knowledge; and we may learn also, what is not less important, the point at which our knowledge terminates, and beyond which it is needless for us to strive to penetrate into Nature's mysteries. We must not, however, satisfy our consciences with the belief that these things will explain the whole of the differences of opinion and doctrine which exist among us. Undoubtedly, much more is to be attributed to haste and carelessness, and the perversion of our judgment by various prejudices, than to anything besides. It would be vain for anyone among us to expect that, by any effort, he should become wholly divested of these qualities which interfere with and clog the operations of the intellect; but it is our duty, and, I may add, it is our real interest, to do what we can towards it: and thus, having considered what is the mode of inquiry proper to be pursued, we are led to consider also what are the mistakes into which we may fall if we are not careful to avoid them.

You will not have been long engaged in your professional studies before you have discovered how great is the danger of being misled by careless and hasty observation. I have already remarked, that the power of observation may always be improved by cultivation. But it seems as if, in some instances, the attempt at improvement is never made, and that one who is a bad observer in the beginning remains a bad observer through his whole life. I have in my recollection the circumstance of a member of our craft who, for many years, had had much more than common opportunities of surgical experience, but who, nevertheless, on examining what seemed to others to be an adipose tumor, gave it as his opinion that it was chiefly wind! This, indeed, may be regarded as an extreme case, and a mistake so absurd as this can be scarcely called mischievous. The really mischievous mistakes are those which are less easily detected, and with which, unfortunately, both medical and surgical literature abounds. For example: a surgeon of eminence in a provincial city published an account of a case of ununited fracture of the femur, in which he stated that, having made an incision on the part, he sawed off the ends of the bones, and thus, having converted the case into one of compound fracture, and treated it accordingly, obtained the necessary union, so that the patient recovered the use of his limb. Now I have been informed, on what I regard as the very best authority, that, in this instance, the surgeon mistook the effects of the thickening and consolidation of the soft parts round the fractured bones consequent on the operation, for the union of the bones themselves, and that when, after some time, the effused lymph had become absorbed, it was found that the bones were still ununited; and I am further informed, that the patient having died afterwards, an examination of the body was made by another practitioner, who had been a pupil of the operator, which confirmed the fact of the entire absence of bony union. That such a mistake should have been made is, to me at least, not very remarkable, as I was very nearly making the same myself in one instance, in which I attempted to cure an ununited fracture of the thigh by the introduction of a seton. What we have a right to complain of is, that the surgeon published the history of the case prematurely, and more especially that he should have allowed it to remain in the records of the Royal Medical and Chirurgical Society as an example of an operation which had proved to be successful, when he knew that it was otherwise.

It would be well if this had been a solitary instance. A large proportion of the observations published by medical writers are not more accurate than that which I have just mentioned, the difference being that, in matters connected with internal disease and the effect of medicines, the mistakes are less glaring, more easily made, and less easily detected, even by those who make them, than in surgical operations. Many of the wonders said to be wrought by new medicines belong to this category. It is not that those by whom they are recorded in general mean to publish untruths, or wish to deceive others, but they deceive themselves; and it is easy for them to do so. The love of novelty, an unreasonable anxiety to obtain an immediate reputation, vanity, and even the love of knowledge itself in an over-sanguine mind, may mislead the judgment. The process of self-deception on these, as on other occasions, is very simple. One set of facts is presented to the mind in such vivid colours as to exclude the rest; and although this undoubtedly proves an imperfection in the intellect, in many instances it proves nothing else. It is an imperfection to which all persons, whatever may be their pursuits, in a greater or less degree are liable; and the question is not so much who is without it, as who has been most successful in his endeavours to correct it. Not to make such endeavours is to allow the imperfection to become aggravated; and it is by this kind of self-indulgence (as it seems to me) that some persons at last bring themselves to believe just what they like, to believe in any subject that comes before them.

The greater facilities of publication which are afforded in modern times, joined to the increased competition in all professions and pursuits, has very much tended to increase the number of crude and undigested facts which are put forth to the public. The rule of '*nonum prematur in annum*,' which is still more applicable to science than it is to poetry, is almost wholly neglected. Among a good deal of what is valuable there is very much of a very opposite quality; and one of the greatest difficulties which you will have to contend with is, to distinguish the one from the other. Internal evidence will help you a good deal, but your own experience will help you more; and, as your experience increases, so will the distinction be more easy. In the meantime, a judicious scepticism will be your surest safeguard against the contrary errors of too easily believing and too hastily rejecting the statements of your cotemporaries.

Mistaken observations are a principal, but not the only, cause of wrong conclusions. The deduction of them from a too limited number of facts is not a less frequent source of the same error, and, between the one and the other, it must be owned that no small proportion of the general principles enunciated by medical and surgical writers rests on no substantial basis. I do not here so much refer to those larger generalisations which are intended to include and explain the great mass of the phenomena of disease, constituting what are called systems of medicine (and on which the best commentary is, that from Brown to Darwin, from Darwin to Broussais, they have come and departed like shadows), as I do to those minor generalisations, which, if properly conducted, are of the greatest value, and without which neither medicine nor surgery would have any claim to be placed in the ranks of science. Examples of this imperfection are to be found chiefly among the speculations of those who have neglected the means of obtaining personal experience, who think without the proper materials of thinking; but they are not confined to them, and even the most distinguished masters of our art, and those to whom we are the most deeply indebted, have not been altogether exempt from it. Dr. Jenner learned from persons employed in the dairies of Gloucestershire that those who had been accidentally inoculated with the vaccine virus were observed to be not afterwards liable to be affected by the small-pox. He made the experiment of communicating the disease artificially, and found the result to be such as he had been thus led to anticipate, and he gave his information to the world. Vaccine inoculation was soon very generally adopted, and, at first, without any instance of its failure. After some time, however, reports prevailed of persons who had the small-pox after previous vaccination. These were exaggerated, chiefly by some physicians and surgeons of doubtful reputation, and, certainly, of an inferior order of mind, who not only denied the efficacy of vaccine inoculation as a preventive of the small-pox, but published most absurd and unfounded histories of the mischief that it occasioned to the constitution. On the other hand, Dr. Jenner and the other ardent supporters of the new system of inoculation refused to believe that there could be any failure, and, one after another, cases that were supposed to be cases of small-pox after vaccination were declared to be nothing more than cases of *varicella*, or chicken-pox. Time and more deliberate inquiry, now that these two classes of enthusiasts have left the stage, have disclosed the real truth. The cow-pock is a preventive of the small-pox only to a limited extent. A large proportion of those who have had the former are nevertheless liable to be affected by the latter disease; but the small-pox which occurs under these circumstances is so slight and so modified, that it is a very rare circumstance for it to be attended with any severe or dangerous symptoms. This is proved not by the experience of a few individuals, but by statistical returns derived from the experience of the whole country; so that there can be no doubt that the world has been the greatest gainer from Jenner's discovery, and that, in spite of a somewhat hasty generalisation in the first instance, he is rightly placed among the principal benefactors of the human race.

The late Mr. Abernethy published an essay on the treatment of what is commonly called *lumbar* abscess. In a case of this kind he punctured the abscess, making a valvular opening, allowed the matter to escape, and then caused the puncture to heal by the first intention. When the contents of the abscess were again collected, but without allowing it to become so distended as in the first instance, he made another puncture, allowing it to heal as formerly. This process being repeated, each time with a smaller collection of matter, at last the cavity was, or was supposed to be, altogether obliterated. Other cases having occurred in which the application of the same process was apparently productive of the same good result, Mr. Abernethy came to the conclusion that he had discovered a simple method of curing what has generally been regarded as a very formidable disease. This conclusion, however, has not been confirmed by the experience of other surgeons, and the researches of pathology have shown why *à priori* we might not expect this mode of treatment to be generally successful. It is now well known that what is called a lumbar abscess is not an original disease, but merely the effect of caries of the lumbar vertebræ. The exceptions to the rule are so few, that they need scarcely be taken into the account. Nothing done to such an abscess can cure the original disease in the vertebræ; and, wherever dead or carious bone exists, suppuration will proceed until the dead bone is thrown off by exfoliation, or the carious bone is covered with healthy granulations. Whether, in the cases recorded by Mr. Abernethy, it so happened that there was really abscess in the soft parts unconnected with vertebral disease, or whether (which is much more probable) he did not keep the patients in view for a sufficient length of time afterwards to enable him to determine whether there was or was not a permanent cure, it is difficult to say. However that may have been, I believe that, at the present time, no doubt exists in the mind of any experienced surgeon that the principle which he laid down was the result of a too hasty generalisation, and that it ought not to influence our conduct in the treatment of the same disease.

It is observed by Archbishop Whately * that 'the degree of evidence for any proposition we originally assume as a premiss is not to be learned from logic, nor from any one distinct science, but is the province of whatever science furnishes the subject-matter of your argument. None but a politician can judge rightly of the degree of evidence in politics; a naturalist in natural history, &c. &c.' If this be true with respect to so simple a science as natural history, it cannot fail to be so with respect to the more complicated sciences belonging to the medical profession; and you will not, therefore, be surprised that, if errors of generalisation are made by those who have made these sciences their peculiar study, still graver errors should be made by those who have not studied them at all. It would be absurd to suppose that any degree of sagacity, or any power of reasoning, will enable you to come to a right conclusion on any one subject, without a knowledge of all the facts in any way appertaining to it. M. Arago was deceived by the tricks of a girl, whose exploits in kicking down chairs and tables were attributed to her being overcharged with something like electricity. There might have been no defect in his reasoning on what he believed to be the facts of the case; nevertheless we cannot regard so great and influential a person as having been free from blame when he presumed to reason on a subject of which he had such insufficient knowledge. If M. Arago had been at the pains to obtain information from others as to the strange physical and moral condition which in certain individuals is connected with a disposition to hysterics, he would not have needed the assistance of so illustrious a body as the Royal Academy of Sciences to enable him to expose the artifices of the impostor.

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* Whately's Elements of Logic, book iv. chap. i. sect. 2.

In the public journals of the last month I have seen an advertisement relating to the establishment of a *mesmeric* hospital, in which patients are to be mesmerised, in order that they may be subjected to surgical operations without suffering pain, and the names of several noblemen and gentlemen (one of them a Cabinet minister!) are to be found in the list of the patrons of this new institution. It would be well to inquire, Have these individuals been themselves present at such a number of operations performed under what is called the mesmeric influence, as would furnish the data requisite for the adoption of a new principle in pathology? Have they had the assistance of competent persons in the investigation of matters with which they are not themselves familiar? Are they aware that a large proportion of those who undergo surgical operations without being mesmerised scarcely complain of pain, whatever they may feel; that it is not very uncommon for them to converse at the time, as if they were indifferent spectators; and that it seems to be in the power of almost anyone, under the influence of excitement, or a strong moral determination, to sustain bodily suffering, without any outward expression of what he suffers? Have they read the history of the sleeping man, recorded in the 24th volume of the 'Transactions of the Royal Society,' who, though tormented in various ways, by pins thrust into his flesh, by scarifications and cupping, and spirit of ammonia thrown into his nostrils, never could be roused from a state of profound sleep for four entire months; but, nevertheless, was not so insensible to other external impressions as to be prevented from regaling himself daily on bread and cheese and beer, and performing certain other functions, the necessary consequence of eating and drinking, in an orderly and decent manner? And, lastly, are they aware that other cases of the detection of similar impostures are recorded on the best authority?

There is no greater desideratum, either in medicine or surgery, than to have the means of allaying or preventing bodily pain, not only in cases of surgical operation, but in other cases also; but there is too good reason to apprehend that it has not been reserved for the revival of animal magnetism under a new name to accomplish that for which all physicians and surgeons have been looking in vain from the days of Hippocrates down to the present time.

In representing to you the necessity of proceeding with due caution in the deduction of general principles from individual facts, I should be sorry if I led you to believe that advances in science are to be made in no other way than by a strict and severe process of induction. On the contrary, an hypothesis, in which we assume that a principle may be true, although we cannot at the time positively prove it to be so, may often be employed with the greatest advantage; and it is, indeed, the principal method by which inventive genius, observing analogies which are unobserved by others, is led to discoveries. When Newton's mind was first directed to the law of gravitation, it was an hypothesis; but, when he had ascertained that the law universally prevailed, that it explained the phenomena of the heavenly bodies, and that these could not be explained otherwise, it became a true theory. Without the aid of hypothesis, Davy would never have ascertained the powers of the voltaic battery, or decomposed the alkalies, nor would there have been any other researches by experiment. But, in having recourse to it, we must bear in mind that the value of an hypothesis depends on its having a sufficient foundation in probability; that otherwise it must be, to say the least of it, a fallacious guide. On all occasions we must be careful that we do not take it for more than it is worth, and that we use it discreetly. A too great affection for a favourite hypothesis is apt to lead us to misinterpret facts, so that we believe them to be different from what they really are. It has been supposed that the brain is a sort of voltaic pile, and, indeed, there are facts which seem to justify the suspicion that something corresponding to the electric influence is generated in that organ; but, when we are told, in support of this opinion, that 'the sensation communicated to the hand by the beating of the brain, or even of the larger arteries, bears a strong resemblance to a voltaic shock,' we know that, instead of the hypothesis having been suggested by the fact, the supposed fact is but a fiction made to suit the hypothesis.

I have already exceeded the usual limits of a discourse of this description. In concluding it, however, there is one other point on which I would offer you some advice.

In the first instance, consider yourselves as occupied with the study of a single science; for so, indeed, it is. In every department of your profession, the phenomena to be observed belong to the same class, and are reducible to the same general laws. In the treatment of different diseases, you are to be guided by the same principles. Do not, however, suppose, that, by any effort, you will succeed in making yourselves perfect masters of the whole. If human life were longer—if the human mind were more capacious—if, without the necessity of sleep, it could continue in active operation during the entire twenty-four hours—then, indeed, it might be otherwise; but, circumstanced as we are, we must be content to follow the example of those who are engaged in other scientific investigations, by setting a limit to our ambition, devoting ourselves especially to certain subjects of inquiry, and aspiring to no more than a general knowledge of others.

The division of the profession into different branches is neither arbitrary nor artificial; it has been produced in the natural course of events for the convenience of the profession itself, and of the public. The lines of division are not, indeed, exactly defined, nor are they the same everywhere. They differ in large cities and in small ones: in densely-peopled and thinly-peopled districts. They differ according to the tastes and habits of individual practitioners, and, still more, according to the special opportunities which they possess of experience in one way rather than in another. But everywhere, in a greater or less degree, such divisions do and must exist; and, whoever makes it his object to be more excellent than others in one department, must be satisfied with being either inferior, or not above mediocrity in others.

ADDRESS

ON DELIVERING THE PRIZES TO PUPILS OF ST. GEORGE'S HOSPITAL.

October, 1850.

Although several years have now elapsed since I resigned the office of surgeon to the Hospital within whose walls we are now assembled, I trust I need not assure you of the great interest which I still feel in the prosperity of the Hospital itself, and in the reputation of the medical school which is connected with it. It would, indeed, be strange if it were otherwise. It was here that I began the study of that profession, the practice of which has been the main object of my life. For whatever knowledge I have been able to acquire, for whatever advantages have accrued to me professionally, for these I am more or less indebted to my connection with this institution; which is, moreover, associated in my mind with many agreeable recollections of friendships with my colleagues and pupils—of the interesting pursuits, the hopes, and fears, and aspirations of my early life.

It was my good fortune to be elected Assistant-Surgeon to the Hospital at a very early period; and partly as Assistant-Surgeon, and partly as Surgeon, I was attached to it during the space of thirty-two years. In that period great changes were accomplished. The old inconvenient building (which nevertheless had afforded the means of obtaining a great reputation to Sir Cæsar Hawkins and Dr. Heberden, Dr. Baillie and Sir Everard Home, and a still greater one to Hunter) was exchanged for this handsome and commodious edifice, possessing all the advantages over the former one which greater experience and the improved state of science could afford. Let honour be given where honour is due! In adverting to this subject, it is but just that I should add, that it is chiefly to one individual that we are indebted for this great improvement in our condition. It was Mr. Fuller who first proposed that the Hospital should be rebuilt. Many thought it a hopeless undertaking; and it may well be doubted whether at that time it would have been successful, if it had not been for his determination and perseverance, and for the spirit which he infused into those who, in the first instance, were less sanguine than himself.

It is indeed to me a source of great satisfaction to find the St. George's Hospital of the present day, so much better adapted than that of former times for all the purposes for which a hospital is required, whether as furnishing the means of relief to the humbler classes of society when suffering from accidental injury or disease, or as a place of instruction for those who are being educated for the medical profession. There are, however, other recollections of a less pleasing character, which force themselves upon me when I recur to the period of my early connection with this Institution. Of those under whom I myself studied, of those who were my fellow-students, of those who were my colleagues, and even of those who were junior to myself, how many have disappeared! how many have passed into that region from which no traveller returns! One individual, however, who was Assistant-Surgeon when I was yet a pupil, and who was my colleague afterwards, still remains among us. During the term of thirty-two years Mr. Keate and myself laboured cordially together; and I may, I believe, affirm, that not only no unkind word, but that scarcely even an unkind thought ever passed between us. It is not for me to determine how far we were successful, but I may say that we were alike anxious, and neither one of us more than the other, to render the Hospital more efficient, both as a receptacle for the sick, and as a medical school. You must excuse me if I take this opportunity of expressing how much I am myself indebted to the example which Mr. Keate has afforded me of an accomplished surgeon, and a man of integrity, and a gentleman. Nor are these observations irrelevant on the present occasion, as I am thus enabled to point out to the younger members of our profession by what rules they should shape their course, if they would enjoy the esteem and respect of others as they advance in life.

It is not, however, to those who are already members of our profession, but to those who are now engaged in study, and who aspire to belong to it hereafter, that I now more especially address myself. Many of you are in the very outset of your career; you are probably for the first time in the metropolis, for the purpose of attending lectures, dissecting, and of observing diseases, and the treatment of disease, in the hospital. You are entering on an unknown region, in which you have no experience of your own to guide you; and it is reasonable to suppose that you may derive some assistance from the experience of an older person, who was formerly in the same situation as yourselves.

And, first, let me impress on your minds that the next few years are the most important and critical period of your lives. You are now to lay the foundation of that knowledge on which your future character—nay, your very subsistence—is to depend. Let these years be wasted, and you will never be able to redeem the loss. Ceaseless but unavailing regrets will haunt you during the remainder of your days. But let the opportunities which are now offered to you be properly cultivated, and twenty years hence you will reap the advantages resulting from the labour which you may now undergo, and the effort which you may now make to keep within reasonable limits the not unnatural desire of youth for leisure and amusement.

It is well, before you enter on these new pursuits, that you should satisfy yourselves as to what will be really required of you, in order that those who feel that they have not in them the resolution to make the necessary sacrifice, may turn aside to some less arduous, though probably less honourable, occupation.

You must be regular and constant in your studies; you must miss nothing; for what you learn one day is not only important in itself, but is like the link of a chain, and is necessary for the right understanding of what you are to learn on the following day.

'Pater ipse colendi
Haud facilem esse viam voluit.'

At no time could anyone qualify himself for our profession without devoting himself wholly to the task. But if that were true a century ago, how can it be otherwise at the present time, when the competition is so much increased, and when there is so much greater a mass of knowledge to be obtained than formerly. I leave it to your respective teachers to tell you what lectures to attend, what time to devote to the dissecting-room and hospital. The advice which I shall now offer to you, as to the conduct of your studies, is of a more general nature. Take notes of your lectures, however brief; not in the first instance for the purpose of transcribing them (for that is better done at a more advanced period of your education), but for the purpose of keeping up your attention to the lecture at the time, and of giving you the habit of fixing your attention afterwards. The incapability of fixing the attention is one of the chief difficulties under which medical students generally labour, especially those who do not come directly from school or college. Much here depends on the individual mind, much on early habit. Where the difficulty exists, some will overcome it more easily than others; but, whatever may be the amount of effort necessary for this purpose, the effort must be made; and I venture to say, that, unless there be some actual deficiency of intellect, it will not be made in vain.

For many years past I have offered a prize to the students of St. George's Hospital for the best series of clinical notes of cases, with commentaries on them. I was led to do so, because I was satisfied that it is only by taking notes of cases at the patient's bedside, that a student can derive any real advantage from his studies at the hospital. You may go daily round the wards, staring at what is going on, and every now and then listening to an observation made by the physician or surgeon; but you will never obtain any precise knowledge, either of the progress of disease, or of the effects of remedies, unless you investigate cases for yourselves, with your note-book and pencil in your hand. The notes thus taken should be transcribed in the evening, and preserved for future use. You will find them the best things to refer to (as far as they go, much better than books) in after life; and in transcribing them, many things will occur to you which would not have occurred to you otherwise. And this leads me to another subject. In what are called the golden verses of Pythagoras, we are told that before we sleep at night we should review the whole of our proceedings during the day with reference to our moral conduct; and very good advice it is—worthy of a Christian, though it comes from a heathen philosopher. But I would carry the rule further. Always in the evening review your studies of the previous day, and endeavour to recall to mind the principal facts which have been presented to your observation. This will not only impress them on your memory, but it will give you the habit of thought and reflection. For observe, that it is not sufficient for you to store your minds with knowledge. A member of the medical profession, above most others, must learn to arrange his knowledge; to view facts in their relation to each other; in a word, he must learn to think. If knowledge be necessary for him, it is not less necessary that his mind should be so trained that he may know how to use it. However well informed he may be, he will otherwise prove to be a very indifferent practitioner.

There is one other subject in which it may be well that I should offer some advice to the junior part of my audience. You are placed very much at your own disposal in this vast city, where there is much to interest you, much to attract your attention, besides those higher objects for which you are assembled here. You will have many inducements to be idle as to your studies; but let me urge you not to yield to the first temptation. If idle habits are once contracted, it is difficult to alter them; and it is not less difficult to be rid of idle companions. I need not repeat to you, that idleness is incompatible with the acquirement of knowledge. But there is much worse behind. Idleness leads to dissipation, and dissipation to extravagance; and then come debt, disgrace, loss of self-respect, moral degradation. Be careful in choosing your companions. Exercise a proper self-control in the first instance. Make it your business to pass through the period of your professional education, not only with the character of diligent students, but of gentlemen in the *best* sense of the word, and you will be sure of being amply repaid by the enjoyment hereafter of professional success, and the respect of the world at large.

Gentlemen, I offer you this advice, not because you are medical students, but because you are young men. I do not believe that you are more in want of such admonitions than others of the same age. I know not what medical students may be in other schools, but, as to those belonging to this school, with which I was formerly so long and so intimately connected I feel it but just that I should express my sincere conviction that there was always as large a proportion of young men diligent in the pursuit of knowledge, and decorous in their general conduct, as is to be met with in any class of society. Of course there were, and always will be, exceptions to the general rule. And you, and I, and all of us, who would maintain the high character of our profession, must be anxious that these exceptions should be as few as possible.

To you, Gentlemen, who have been the successful competitors for the prizes given annually by the different teachers of this school, I offer my sincere congratulations. If you have gained honour for yourselves, you have also done good to others, for example is better than precept; and there is no one among you who has not exercised a wholesome influence on his fellow-students. Let me advise you to pursue the same course through life, recollecting that, even as practitioners, you must still be students. Knowledge is endless; and the most experienced person will find that he has still much to learn, many opinions to modify, and errors to correct. You are entering on a profession which is good or bad according to the manner in which it is pursued. Let me offer you some suggestions as to your conduct in it. On no occasion allow anything to interfere with the strict performance of your professional duties. Whatever you undertake to do, that do to the very best of your ability, sparing neither thought nor trouble, whether it be in the case of the poor man, to whom you give gratuitous assistance, or of the rich man, who remunerates you liberally for your attentions. Consider yourselves as being engaged, not in a trade, but in the cultivation of a noble and interesting science. Let it be your first object to deserve and obtain the good opinion of all classes of society with whom you come in contact, not only as being skilful practitioners, but as men of honour and integrity. You will thus be in that independent situation, which will place you above the caprice of the foolish, and also above the necessity of stooping to obtain the favour of any individual. Do justice to others, but do justice also to your profession and yourselves, always bearing in mind that those who are in any way usefully and worthily employed have a much higher place in the scale of existence than those useless and selfish persons who live only for themselves, however high their rank, however large their fortune.*

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* In the evidence given by Sir Benjamin Brodie before the Commissioners appointed to inquire into the regulations affecting the sanitary condition of the army, in answer to a question relative to giving prizes to medical students, he replied: 'I have much doubt myself about giving competitive prizes in examinations. It may work well in schools and colleges; but when you come to professional examinations (I do not speak about the Civil Service), I do not think that competitive prizes will answer; for, after all, they will be obtained chiefly by those who are crammed, by the men of good memories, and not by those who work. It seems to me that the man who thinks will not have the advantage that he ought to have. I would limit the prizes to one class, founded upon cases. I believe that the ordinary prizes do very little good. For some time past the teachers in the medical schools have been in the habit of giving prizes to students; yet, notwithstanding this, they are found to be not so well qualified for examination at the College of Surgeons as they were twenty years ago; and hospital surgeons and teachers are now satisfied that these prizes do no good; nay, more than that, that the best men do not get them. These prizes operate in this manner. A man wants a prize; he gets books, reads up the subject, and this kind of work keeps him out of the dissecting-room and the wards of the hospital. Yet these are the only places he can get any knowledge that he can apply to practice, and learn to observe and think.'—C. H.

ADDRESS

AS PRESIDENT OF

THE WESTERN MEDICAL AND SURGICAL SOCIETY OF LONDON.

APRIL 20, 1850.

When I last had the honour of addressing you, I pointed out what I conceived to be the principal advantage of an institution of this kind. Among the foremost of these I mentioned the maintenance of friendly and generous feelings among those who are engaged in the same useful and honourable pursuits, tending to supersede those feelings of distrust and jealousy and petty rivalry, which are unworthy of a liberal and scientific profession; but which (such is the weakness of human nature) are too apt to exist in every class of society, the members of which are not brought into personal communication with each other. For this reason, and setting aside all other circumstances, I am convinced that a society such as ours must tend, in no small degree, to the comfort and happiness of the individuals of whom it is composed. As there is nothing more painful to a well-constituted mind than to be at variance with, suspicious, or distrustful of others, so is there nothing which tends more to elevate the moral character, or to inspire us with peaceful and contented feelings, than the consciousness that our competitors are our friends, with whom we are on such a footing that we mutually make allowance for each other's feelings, and are on all occasions ready to do justice to each other's good qualities, whether of the head or heart.

What I have just now mentioned is a mere matter of fact, and I am sure that there is no one among us who has been for many years engaged in medical practice who will not at once assent to the truth of these observations. It will be well for those who are just entering on the active duties of life, and of whom it may be presumed that they have many years of busy occupation before them, to avail themselves in this particular of the experience of older persons, and shape their course accordingly; and I venture to say that the doing so will save them from many heart-burnings, many sleepless nights, many anxieties which they would have to endure otherwise. In human nature there is much weakness—there are many faults and failings—but mixed up with what we would wish to be otherwise, there is much that is good, that is kind, and noble, and after a long experience of the world I have come to the conclusion that the true way of dealing with mankind is, as a general rule, to trust to their good qualities rather than to the controlling of their bad ones. If you would make a man a gentleman, you must treat him as a gentleman. We are all and everyone of us liable to be mistaken as to the motives by which others are influenced, especially in matters which are supposed to concern our individual interests. To suspect another of being influenced by unworthy motives, is to degrade him in his own estimation; and there is nothing which a proud and independent spirit will find it so difficult to forgive; as, on the other hand, there are few persons who will not feel some sort of gratitude for having the most favourable construction put on their conduct, even when their conscience tells them that it is more than they really merit.

Gentlemen, we are all of us, whatever may be the department of the profession to which we belong, engaged in an arduous undertaking. The lives of individuals, the happiness of families, are entrusted to our care. The medical practitioner can never be off his guard. He never can say, 'To-day I have nothing of consequence to attend to.' The next hour (be it day or night) may place him in a situation in which the life of another person and his own reputation are concerned; and in which, in order that he may preserve the former, and establish or maintain the latter, all his knowledge, and skill, and prudence, and presence of mind, must be summoned to his aid.

It would be needless for me to dilate on the responsibilities, the labour, the anxieties belonging to medical and surgical practice, of which even the youngest man among us must be fully sensible. The public generally have but an imperfect notion of the amount of moral restraint and intellectual effort necessary for the right performance of our duties. We, on the other hand, viewing these things more closely, are, perhaps, too apt to believe that there is no profession of which so much is required as is required of ours. Let us, however, look as closely at other pursuits in life, and I much doubt whether they will gain by the comparison. They have all their respective advantages and disadvantages, and the latter more especially are liable to be overlooked by those who view them from a distance. The solicitor will tell you that questions which relate to the preservation of property are even more perplexing, more harassing, than those which relate to the preservation of life: that the anxieties to which he is liable, instead of being brought to a termination in a few days or weeks, may be prolonged for months or years: that a mere technical error, long overlooked, may rise up in judgment against him who makes it, after a very long interval of time.

But it may be said that it is otherwise with the higher department of the Law; and this, indeed, is in great measure true: but the barrister has his causes for anxiety also, though of another kind. How many are those members of the bar who sit in Westminster Hall year after year, and go circuit after circuit, and yet scarcely obtain a sufficient number of briefs to pay the expenses of their travelling and their chambers! Then, if a barrister succeeds in obtaining an extensive practice, the tenure by which he holds it is proverbially uncertain. Some new candidate may present himself, who is more popular with solicitors, who, perhaps, with less real knowledge of law, has a greater tact in managing a jury, and may *push him from his stool.*

Then, is the profession of the Church to be preferred, as a profession, to our own? There are, it is true, many with ample benefices, who lead a life of comparative ease; and many on whom these advantages are properly bestowed: but how many are there also, pious and devoted persons, living on the smallest stipend, passing through life without the means of putting out their children decently in the world; and subject to this especial mortification, that, except under some peculiar circumstances, they can do little by their own exertions for themselves, and must owe their advancement to the favour and caprice of others, and not to their own merits.

Then, have those engaged in Mercantile Speculations, or any branch of trade, no causes of anxiety? How many do we see apparently prosperous and wealthy, all at once cast down from their high estate, and brought to ruin through their own want of caution; or, it may be, without any fault of their own, through the imprudence and dishonesty of others! With them, even in the midst of success, there may be cause for apprehension. I was desired to visit one of the family of an extensive merchant in the neighbourhood of London. He lived in a magnificent house, with every sign of luxury about him. His medical attendant, whom I met on the occasion, observed, 'Mr. —— himself is ill; but I know the reason of it, he is always so when he expects the arrival of his China ships.'

> 'Cætera de genere hôc, adeo sunt multa loquacem
> Delassare valent Fabium.'

Such was the remark of a great moralist when discussing a somewhat similar question; and it would be easy for me to extend these observations, though it would be a needless waste of time to do so.

Every profession has its advantages and disadvantages. I have referred to the labour, anxieties, and responsibilities of that to which we ourselves belong; but it is well for us to look to the other side of the account. It is not a blank page; and I am much inclined to believe that whoever views the matter with a candid and impartial spirit will find that there is a considerable balance on the favourable side.

I know that it may be said that having been during my whole professional life engaged in one particular line of practice, I cannot be a fair judge of what the profession may be in its other departments. I do not, however, admit the justice of this conclusion. I have friends in all parts of the profession; I know the nature of their occupations, and have watched their progress for many successive years. Then I am confident that there is no situation more trying to him who holds it than that of the young hospital surgeon, exposed (as he very probably is) to the remarks and criticisms of the public, nor any in which there is less repose for the mind, or greater reason to feel anxiety as to the future, than that of an individual whose practice is confined to surgery.

Let us look first at the influence which the medical profession has, or ought to have, on the minds of those who devote themselves to it. Their immediate object is always to do good to others: they are engaged in the pursuit, not of a trade, but of an important science, which concerns the highest interests of mankind in their present state of existence. The medical practitioner must, for his own sake, always aim at the attainment of truth, and endeavour to observe, to think, and reason correctly. All this is good for his moral and intellectual character; and the result is, that with all our errors, and all the imperfections which belong to us, there is perhaps no class in society, on the whole, more liberal, more free from prejudice, and more disposed to render disinterested service to others, than the great body of the medical profession.

Then there is no other profession in which the individuals belonging to it have to depend so entirely on their own character and conduct. Whatever advantages you may obtain in life, you earn them for yourselves: you acquire the good opinion of the public of all classes, but you neither owe, nor can owe, any obligations to the favour of the great. Others may be kindly disposed towards you, but your most zealous friends—your nearest relatives—will not entrust their lives and the lives of their families to your care unless they believe that it is their interest to do so: and hence it is that the medical practitioner who has laboured to obtain an adequate knowledge of his art, and who honestly and diligently performs his duties, has a right to consider himself as one of the most independent members of society.

I must here confess that it seems to me that this sense of independence is not sufficiently impressed on the minds of a large proportion of our profession. You may be assured that there is no one who thinks it worth his while to place himself under your care, to whom you are not really of more importance than he can be to you: what you can give to him is more than anything that he bestows on you in return. But, if you would have others do you justice, you must first do justice to yourselves; and how is that to be accomplished? It is by shaping your conduct with a view to the general result, and obtaining the good opinion of society at large, of persons of all classes, high and low, rich and poor, without reference to what may be said or done in particular cases or by particular individuals. We have to deal with the wise and the foolish, with those who know how much, or how little, they may justly expect from our assistance, and with many the victims of luxury, idleness, and an imperfect moral education, who not only expect too much, but who think that they have a sort of right to expect an exemption from the evils of life, such as it does not belong to human nature to attain. Among the last-mentioned persons we cannot fail to meet with perverseness and caprice; or to find that, when we have done that which it is possible, we are blamed because we have not done that which it is impossible for us to perform. But all this need be no more than a temporary annoyance to the upright and diligent practitioner, who is conscious that he has laboured to attain an adequate knowledge of his art, and that on all occasions he endeavours to do his best. Such persons as I have described may display their caprice by changing their medical attendant, by resorting to one quack after another, and, as far as we are concerned, it is really much more desirable that they should do so, than that they should remain under the care of anyone of us, when they think that they can do something better for themselves.

Let me not, however, be misunderstood, as making these observations in any spirit of unkindness or hostility to those to whom they relate. If we claim, as claim we must, that allowance should be made by others for our own failings and imperfections, much more are we called upon to make allowance for the failings and imperfections of those who labour under the inflictions of bodily disease. We have to a great extent the power of relieving pain and preserving life, but our power is limited; on the other hand, there is no limit to the desire of obtaining relief, and the anxiety to live may still linger in those who are on the point of death. Under these circumstances it seems almost a matter of course that those to whom we can render no further aid, and whose minds are probably weakened by previous illness, should be easily induced to seek for aid elsewhere, and be ready to listen to any promises of men, however vain and absurd, or even dishonest, those promises may be. Taking all things into consideration, it appears to me to be a question whether there is not, on the whole, more cause for wonder in the patience of the many than in the impatience of the few; and whether the gratitude of those who overestimate our services does not even more than compensate for the neglect of those who withhold from us the credit which we really deserve.

In enumerating what I believe to be the advantages belonging to the profession of which we are members, there is one other point which I ought not to overlook. However much assistance we may in early life derive from attendance on lectures, and afterwards from the study of books, the knowledge which we thus obtain, necessary as it is, is nevertheless only of a preliminary kind, and is nothing at all in comparison with that which each individual derives from his own personal experience. The consequence is, that every succeeding year, the medical practitioner becomes more equal to his duties than he was before; and, except it be in the case of those whom an over-weening self-confidence renders careless and indifferent, this improvement continues as long as we retain the integrity of our faculties unimpaired by disease or age: hence it is, that medical practice is not liable to the fluctuations of which those engaged in some other professions have too much reason to complain. In his own circle, the place of the experienced and judicious medical practitioner is not easily supplied. This his patients feel, and this he must feel himself. The principal source of anxiety to a professional man in the beginning of his career is the doubt whether he will maintain whatever reputation he has been able to acquire. If anyone case turns out less fortunately than he had reason to expect, he dreads (and much more than he need to do) the influence which it may have on his future fortunes. But this source of anxiety gradually diminishes as years increase, and at last he discovers that he may safely rely on his general character, which is independent of the successful or unsuccessful termination of a particular case.

But, after all, the value of the profession to each individual engaged in it depends more on the individual himself than on any extraneous circumstance. It is an indifferent and irksome trade; but it is a noble and interesting science. If you would pursue it with credit and comfort, you must regard it as the latter, and not as the former. And this explains one great advantage of a Society such as that which I now address—which brings us together as men of science, not as the proprietors of a railway or canal, to discuss the value of shares and the amount of dividends, but to compare our experience, to increase our knowledge, and thus to have our minds elevated above the meaner pursuits of life.

ADDRESS

AS PRESIDENT OF THE ETHNOLOGICAL SOCIETY OF LONDON.

DELIVERED AT THE ANNIVERSARY MEETING

MAY 27, 1853.

Our accomplished Secretary, Dr. Cull, will give you some account of the principal additions which have been made to our knowledge of Ethnology in the course of the last year, a task for the performance of which he is far better qualified than I am. But previously to his doing so I beg leave to occupy your time, for a few minutes, by offering some general observations illustrative of the objects for which this Society has been instituted. These objects are neither few nor unimportant. The subject is one of the highest interest to the philosopher; at the same time that, if the inquiry be properly directed, and the results properly applied, it will be found to be not less deserving the attention of the moralist and the statesman.

Mankind, scattered as they are over the entire surface of the globe; located among the perpetual snows of the Arctic regions, and in the perpetual summer of the Equator; on mountains and in forests; in fertile valleys and in deserts; in lands of rain and tempests; and in those which are never or rarely blessed by descending showers—are presented to us under a vast variety of aspects, differing from each other, not only as to their external form, but also as to their moral qualities and intellectual capacities. The first question which presents itself to him who is entering on that extensive field of observation which Ethnology affords is, Do these beings, apparently so different from each other, really belong to one and the same family? are they descended from one common stock? or are they to be considered as different genera and species, descended from different stocks, and the result of distinct and separate creations? Those to whose opinions on the subject we may refer with the greatest confidence —among whom I may more especially mention our own countrymen, Mr. Lawrence, Dr. Prichard, and Dr. Latham—have come to the conclusion that the different human races are but varieties of a single species; and without entering into all the arguments which have been adduced by these philosophers, I may observe that there are many facts which seem, as it were, to lie on the surface, and which are obvious to us all, that may lead us to believe that this conclusion is well founded.

Although we justly regard the intellectual faculties as of a higher order than those which belong to mere animal life; although it is as to these alone that mankind '*propius accedunt ad Deos*;' yet it must be admitted that up to a certain point, and within its own domain, instinct is a more unerring guide than human reason. And what is it but instinct which leads us at once to recognise the Esquimaux, the Negro, the Hottentot, as belonging to the same order of beings with ourselves, with as little hesitation as the greyhound, the spaniel, the mastiff, mutually recognise each other as being of the same kindred?

Then be it observed, that, however different may be the external figure, the shape of the head, and limbs, there is no real difference as to the more important parts of the system, namely, the brain, the organs of sense, the thoracic and abdominal viscera; and the medical student is aware that he obtains all the knowledge which he requires just as well from the dissection of the Negro or the Lascar as from that of the Anglo-Saxon or the Celt. Even as to the skeleton, the difference is more apparent than real: there is the same number, form, and arrangement of the bones; and, I may add, there is the same number, form, and arrangement of the muscles.

Pursuing the inquiry further still, we find that the different sexes are mutually attracted to each other; that their union is prolific; that the period of gestation in the female is the same in all; and that—unlike what happens as to hybrid animals—instead of stopping short after one or two generations, their offspring continues to be prolific ever afterwards.

Nor is there anything difficult to understand, nor contrary to the analogy of what happens among other animals, in the production of the different varieties of mankind. The Hottentot and the Anglo-Saxon have a closer resemblance to each other than the mastiff and the spaniel. How different is the Leicestershire from the South-down breed of sheep; and the English dray-horse from the thorough-bred Arabian. We see these changes actually going on, nay, we actually produce them artificially among our domesticated animals; and we see them taking place, to a certain extent, even in our own species. The Negroes taken from on board the captured slave-ships and transported to Jamaica, have a different aspect from those who have been for some generations domesticated in the service of the planters. The descendants of the Anglo-Saxon race transplanted, within the last two centuries, to other regions of the globe, are already beginning to be distinguishable from those who remain in the parent country by their external appearance, and, even to a greater extent, by their characters and habits. It was observed to me by a gentleman who has served his country in important official situations in Europe, and on the other side of the Atlantic ocean, that if, in going from England to Italy, he was struck with the comparative passiveness of the Italians, on returning to England from America, he found something still more remarkable in the passiveness of the English compared with the excitement and activity observable among the citizens of the United States. If in the present condition of the world, when there is so free an intercourse among its inhabitants, and so constant an intermixture of races, such changes are to a certain extent going on, it is easy to conceive that changes still more remarkable might have taken place when human society was in its infancy; when nations were separated by impassable seas and mountains; when there was nothing to interfere with the influence of climate, food, and mode of life on the physical and moral character; and when repeated intermarriages among individuals of the same tribe were favourable to the transmission of accidental peculiarities of structure to succeeding generations.

There was a period when a jealousy prevailed of studies such as those of the Geologist and Ethnologist, from a supposition that they in some degree tended to contradict the revelations of the earliest of our sacred volumes. The advancement of knowledge has shown that such jealousy was without any just foundation; and those who on such narrow grounds stand aloof from the pursuits of science are now reduced to a small and almost unnoticed minority. It is, however, satisfactory to find that the inquiries of the Ethnologist, so far from being opposed to, actually offer a strong confirmation of, the Mosaic records as to the origin of mankind having been from one parent stock, and not from different creations.

> 'The noblest study of mankind is man.'

So says one of our greatest moralists and poets: and if we estimate them according to the rule which is here laid down, it must be admitted that inquiries into the physical, intellectual, and moral character of the various human races ought to hold a high rank among the sciences which claim the attention of the philosopher. Standing, as it were, midway between the physical and the moral sciences, Ethnology is not less interesting to the Naturalist than to the Metaphysician; and not less so to the Metaphysician than to the Philologist. To trace the influence of climate, of food, of government, and of a multitude of other circumstances on the corporeal system, on the intellect, the instincts, and the moral sentiments, is the business of the Ethnologist: nor is it less in his department to trace the origin and construction of language generally, and the relation of different languages to each other. Infused into it, Ethnology gives a more philosophical character to history; adding to the dry and often painful detail of political events occurring in a particular country another series of facts, which present to us the whole of the human inhabitants of the globe as one large family, constituting one great system, advancing together towards the fulfilment of one great purpose of the Creator.

But in this utilitarian age there are, I doubt not, some who regard Ethnology as offering matter for curious speculation, but as being in no degree worthy of a place among those sciences which admit of a direct and practical application to the wants of society and the ordinary business of life. It is, indeed, with some among us too much the custom to measure things by this low standard, and to forget that whatever adds to our stores of knowledge, and gives us broader views of the universe, tends to the improvement of the intellect, the elevation of the moral sentiments, and thus leads to a more complete development of those qualities by which the human species is justly proud of being distinguished from the inferior parts of the animal creation. The practical genius of the English is essentially different from the genius of the ancient Greeks; but no one can hesitate to believe that the philosophers, the poets, the architects, the sculptors, who form the glory of that wonderful people, are even now exercising a most beneficial influence on the character of mankind, after the lapse of more than 2000 years. Setting aside, however, these considerations, and admitting that it affords us no assistance in the construction of steam-engines or railways; that it is of no direct use in agriculture or manufactures; still it may be truly said, that, even according to his own estimate of things, the most thorough utilitarian who looks beyond the present moment will find that there is no science more worthy of cultivation than Ethnology. Is there anything more important than the duties of a statesman? and can there be any more mischievous error than that of applying to one variety of the human species a mode of government which is fitted only for another? Yet how often, and even in our own times, from a want of the necessary knowledge and foresight on the part of those to whom the affairs of nations are intrusted, has this error been committed. Even within the narrow limits of our own island there are two races having each of them their peculiar character. But the British empire extends over the whole globe. It comes in contact with the descendants of the French in Canada; with the Red Indians of America; with the Negroes of Sierra Leone and Jamaica; with the Caffres and Hottentots of South Africa; with the manly, warlike, and intelligent inhabitants of New Zealand; with the rude Aborigines of Australia; with the Malays, the Hindoos, the Mussulmans, the Parsees, the Chinese in the East—races differing widely from ourselves, and not less widely from each other. Surely much advantage would arise, and many mistakes might be avoided, if those who have the superintendence and direction of the numerous colonies and dependencies of the British crown would condescend to qualify themselves for the task which they have undertaken by studying the peculiarities of these various races, and by seeking that information on these subjects which Ethnology affords.

This Society is yet in its infancy. But those who have attended its Meetings will bear testimony to the value of the written communications which have been made to it during the present Session, and of the discussions to which these communications have led. Seeing how much has been already accomplished, and the zeal which exists among its members, I am, I conceive, not too sanguine in my expectations, when I anticipate that the Ethnological Society will from year to year advance in reputation and usefulness; and that the time is not far off when, its labours, and the objects which it has in view, being justly appreciated by the public, it will be ranked amongst the most important Scientific Institutions of the age.

ADDRESS

DELIVERED AT THE FIRST MEETING OF THE

NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE

AS PRESIDENT OF THE SOCIAL ECONOMY DEPARTMENT.

OCTOBER 13, 1857.

A VERY prudent suggestion has been made by the general committee to the effect, that the authors of the papers communicated to the several departments should be at the pains of condensing their observations into a moderate space. I am not aware that it was intended to apply this rule to these preliminary discourses. I am, however, well inclined to observe it in my own case; partly because I find the subjects which may be brought before the Department over which I have the honour to preside, to be so numerous, that it would be difficult to bring them before you as a whole, or as forming anything like one connected series; and, partly because, only a short time having elapsed since I undertook to act as President, I really have not hitherto had sufficient leisure to give them that thorough and complete consideration which they so well deserve. Some other reasons why I should not just now make any very unreasonable demand on your attention will occur to those who hear me; namely, that many general observations, which I might otherwise have offered, have been anticipated by the discourse of our noble and learned President; that our hours are limited, that our time is running on, and that there is much danger that sufficient time may not be left us for even a partial discussion of the various important questions which will be brought before us.

Under the head of social improvement many subjects may be included, of which only a few, by way of examples, are referred to in the printed programme put forth by the general committee. Now, the first remark which it occurs to me to make is, that numerous as these subjects are, and distinct and separate from each other as they may at first seem to be, they are not so distinct and separate in reality. There is no one of them, the investigation of which will not serve to throw light upon some others. As it is in the physical sciences, so it is in the moral. The questions which relate to the well being of society hang one upon the other; so that to direct our attention exclusively to any one of them would not only answer no good purpose, but would actually mislead us. For example: it is in our department to consider the ill effects not only of absolute drunkenness, but those which arise from the too free use of fermented and spirituous liquors generally. But if we would remedy these evils, it would be next to useless simply to expose them to view, and read lectures and give good advice. We must first go to the education committee, and ask them to obtain for the mass of the population, not what might be called a complete education, which is really out of the question, but the capability of reading, and such an access to a lending library, after their school studies are completed, as may afford an occupation for their leisure hours, and form a sort of counterpoise to the attractions of the public-house; and then we must go to the sanitary section, and ask them to promote such measures as may enable the agricultural labourer to have a comfortable home to receive him after he has done his work; and such other measures as may afford to the residents of some of the crowded, ill-drained, and ill-ventilated districts of our overgrown metropolis a freedom from that impure air and those noxious vapours from the depressing effects of which they now seek a transient relief by resorting to the gin shop. So with respect to another crying evil, as to which much has been lately said in the public journals. If we would lessen it, we must first devise some means for the employment of young women beyond those which now exist, and the want of which is one cause of their resorting to what may, perhaps, be regarded as being, on the whole, the most unhappy of all modes of life. If we attempt to lessen this evil, merely by carrying off and providing for its victims, we shall find it to be like the Hydra of the Greek mythology, whose heads sprouted out again as soon as they were cut off. So, also, as to what are called reformatory schools. If wisely conducted, they may become instruments of the greatest good; but if they were to fall into the hands of those who have more benevolence than discretion, who, limiting their views to the one special object, do not take other things into consideration, then there is great danger that by taking too great care of and pampering young criminals, we may excite the jealousy of others, and lessen the inducements to persevere in the right course in the hitherto honest part of the population.

The same care to look beyond the thing immediately before us is necessary if we would inquire into the condition of society, and the nature and extent of the other evils with which it is infested. Thus I find, by referring to the Registrar-General's report, that the illegitimate births registered in London are in a smaller proportion to the legitimate births than in any other part of the kingdom. In one year, while the illegitimate births in London were only 3·2 in 100, in Derbyshire they were as 8·3, and in the North Riding of Yorkshire they were actually as 9 in 100. With these facts only before us, we might say how remarkable it is that, in this respect, London should afford so much better an example as to morality than other places. But, with a little consideration, the wonder vanishes, and we find too good reason to believe that the apparently greater morality is to be traced to something very different from greater virtue in the metropolitan population.

The general secretary has sent me a list of papers communicated to the department which is described as that of 'Social Economy.' They are of a very miscellaneous character. Some of them might, indeed, just as well have been referred to some other section;

however, this may be explained by a fact to which I have already adverted, that the different departments of knowledge are so connected with each other, that it is impossible to draw any exact line between them. Some of the subjects on which our correspondents have written, would require a very long discussion, such as would extend far beyond the time which we shall be able to spare for that purpose. But we may think of them, and the public may be induced to think of them, and at some future meeting of the Association we may take them more fully into our consideration. This may seem to be a very slow proceeding; but in truth, unless I am greatly mistaken, the proceedings of this Association cannot be otherwise than slow. Except in such matters as may lead to actual legislation, and may be settled at once by the Houses of Lords and Commons, we can expect to do nothing, except by the extension of knowledge, and acting on public opinion. But knowledge of this kind can only be gradually diffused, and public opinion cannot be taken by storm. We may sow the seed now, and when the present generation has passed away, those who come after us will reap the best part of the harvest.

I shall not presume to occupy your time at present by anticipating the observations which might be made on the various subjects which will come before us in the section of Social Economy afterwards. There is, however, one other subject which I cannot but regard as being of great importance in our social system, as to which I am not a little disappointed to find that we have received no communication, and on which, for that very reason, I shall venture to offer some remarks. I do so, apprehensive that it may be altogether overlooked otherwise, not in the expectation that it can be discussed on the present occasion, but with the hope that, if your attention be directed to it now, some one will make it a special subject of inquiry, and bring it formally before us in a future year.

While we lament over the vices of the age, and are compelled to admit that some crimes, such as those of poisoning, swindling, and dishonesty as to money in various forms, have been more prevalent of late than they were in most of the former periods of our history, we must not shut our eyes to the fact that there is much of good to counteract this amount of evil. If the times in which we live have their peculiar vices, they have also their peculiar virtues. Independently of other things, the most earnest '*laudator temporis acti*' must acknowledge that there was never a period in which there was so much disposition as there is at present, among the more affluent members of society, to extend a helping hand to those less happily situated; to endeavour, by contributing not only a large portion of their worldly goods, but, what is much better, their thought and labour, towards the removal or alleviation of the evils, and even of the inconveniences, of which others have reason to complain. On every side we find charity displaying itself in various shapes. Our schools for the labouring classes, our model lodging-houses, and hospitals, our measures for sanitary improvements, and this very society to which we belong, all bear testimony to the activity of this principle among us. Now, fully admitting its usefulness and excellence, still we must also admit that it requires to be judiciously directed, and that the ultimate and often the immediate effect of an indiscriminate and careless charity, must be to defeat its own object, and be injurious instead of beneficial. With a few exceptions, we may hold it as a rule that there is no good which one man can do to another, which amounts to a tenth part of what each individual may do for himself; and that not in one only, but in every class of society, it is most important that one should feel independent of his own industry whose industry is required, and in all cases of his own character and conduct. The poor's rate is a necessary part of our system. There are certain classes, chiefly in the rural districts, of which the individuals, however well disposed they may be to do so, have little means of making a provision for extreme old age, or to meet the afflictions of accident or disease; and we cannot allow those who are starving, even though it be the result of their own ill-conduct, to die of hunger. But I am old enough to remember and to have witnessed the ill-effects of the poor-law as it was formerly administered in an agricultural population, when sturdy labourers went on a Saturday evening to the house of the overseer to claim as a right an addition to their too low wages, in proportion not to their industry and skill, and their amount of labour, but in proportion to the number of their families, when the industrious had no advantage over the lazy, and when those who were unmarried were accustomed to say, that it was wiser for them to marry, as those who were married were made to be better off than themselves. Even in the present state of the law, the good derived from the poor-law is not unmixed with evil.

It was but a few days ago that a master tailor in London assured me, that many of his journeymen who earn thirty-six shillings and sometimes forty shillings in a week, pass one, and even two days in the week in the public-house, expending a great part of their earnings in beer and spirits, having the consciousness that their wives and children can never starve, as, whatever happens, the parish must maintain them.

These remarks, however, are only in the way of illustration. The poor's rate is a matter of necessity. To dispense with it is out of the question. What I wish to call your attention to at present is the numerous public charities, maintained by subscription, which exist among us. I may well call them numerous, for I have seen rather a thick volume containing an account, or rather a list, of the charities of this kind which are established in the metropolis, and I doubt not that as many in proportion might be enumerated in this and in other large towns.

Now hospitals for the sick, and schools for the poorer classes (unless it be where there are some special endowments for the purpose), cannot be maintained except by subscription, and the cooperation of charitable persons; and where a moderate degree of attention is bestowed on them, they are little open to abuse on the part of those for whose benefit they are established. No one will break his leg, or expose himself to the causes of disease, for the sake of obtaining admission into an hospital; and with regard to schools, it is a very general, though not absolutely an invariable rule, that the parents should contribute some portion of the expense. There are charities not of these descriptions, of which we cannot doubt the usefulness—the sailors' home, for example, and the clothing clubs established in some country villages, in which a small addition to the money deposited encourages saving and prudent habits in the depositors. But on the other hand, there are many, the effect of which is to do much more harm than good. There is a parish in the neighbourhood of London, having a large proportion of persons of a greater or less degree of affluence, where subscriptions are raised, and societies established, for the purpose of visiting the poor from house to house, and relieving their necessities, and it has come to my knowledge that persons have left their former abode to go and reside in this parish, giving as a reason for doing so, 'that there was a great deal of money given away there.' In another parish in which there are several almshouses, the effect produced, as described to me by a friend on whom I can rely, is certainly to give relief to a few deserving persons, but, at the same time, to cause others who are not deserving at all—the idle and the lazy—to be rendered less strenuous in providing for themselves, in the hope that they may obtain this charitable provision instead.

I must not occupy your time by specifying particular instances, nor am I at all disposed to take on myself the obnoxious task of doing so, but I am confident that whoever will take the trouble of looking over the list of the London charities, will find that a very large proportion of them are open to objections similar to that which I have pointed out. It is not that the individual who looks on an almshouse as an annuity, positively relies on it as he might on the poor's rate; but he nevertheless relies on it to a certain extent, generally overestimating the chances in his favour; and the effect cannot fail to be, sometimes in a greater degree, sometimes in a less degree, to paralyse that spirit of independence and self-reliance which is really more valuable than all that charity can give him.

I feel that I may well give some apology for saying so much on one subject in an address which ought perhaps, strictly speaking, to be confined to generalities; still I may claim your patience for a few minutes more, in order that I may advert to two other points which seem to me to be well worthy of our attention. The first is the vast outlay of money which necessarily takes place in some of the public charities, before any portion of that which has been subscribed can be distributed to those for whom it is intended. House-rent, secretaries, collectors, printing, advertising, sending out circulars, abstract, in not a few instances, a large portion of the funds. Nor is this all. There is another source of expenditure which is not the less real because it does not come before the public; I refer to that which falls on the applicants themselves. In the case of these numerous charities, in which the success of the candidates depends on their obtaining the largest number of votes, the mere canvassing for votes cannot be effectually carried on without a considerable expense. I know an instance in which a very deserving woman obtained from a well-known and, I believe, a very well-conducted charity, an annuity of 25*l.* or 30*l.* But it cost her 20*l.* to obtain it. If she had lost her election, she would still have spent her 20*l.*, though to no purpose. I know another instance in which a much larger sum than this was expended in the same manner.

The other point to which I referred, is the influence which the multiplication of public charities which is now going on among us has on private charity. No one can afford to give more than a limited portion of his income in charity of any kind; and I am sure it is a matter of wonder to me, not that so little, but that so much should be contributed in this way. Now where such large sums are absorbed by the public charities, there can be little left for private charity. Yet private charity, if carefully distributed, is a much better thing. First, all the money given goes to its legitimate object; there is no expenditure of it on extras. Secondly, although the relief in the aggregate is not less real, yet as it offers no specific or well-defined object for others to look at, it does not tend in the same degree as the public charities, to lessen the sense of independence and habits of industry. And lastly, private charity binds man and man together; like mercy,

'It is twice blessed;
It blesseth him that gives, and him that takes;'

it engenders kindly feelings between those who help and those who are helped, and contributes, as far as it goes, to unite the different classes of society to each other.

Anyone who would be at the pains of doing it, might collect much valuable information on these subjects, which would be useful in directing the liberality of the public. It might be shown under what circumstances the operation of such charities is beneficial; under what other circumstances it is injurious; and it might also be shown how the money contributed may be applied to the purposes for which it was given, and not be wasted, as it often is, by expenditure in other ways.

If we were to take an account of all the subjects which seem to claim the attention of this section of the Association for Social Improvement, we might well be startled at the prospect of the mountain which lay before us. But the fact is, that the task which we have undertaken is not so arduous as it might in the first instance seem to be. From the beginning of things down to the present time, human society has been undergoing changes arising from causes over which man has no control; and, except on some special occasions, such, for example, as the first introduction of Christianity, and the separation of the Protestant from the Roman Catholic Church afterwards, there probably was never a period when those changes were so prodigious, or when they succeeded each other so rapidly as the present. Railways, steam navigation, the electric telegraph, the discoveries of gold, nay, even those trumpery publications which form the staple of the libraries at the railway stations, these and many other things are all acting so as to modify our social system. Of the changes which are taking place some may be for good and some for evil. We humbly hope, and with some degree of confidence, that on the whole the good will predominate; but be that as it may, the more important of these changes are independent of anything we can do. A mightier power than ours directs the movements of the machine, and we may as well pretend to regulate the seasons, or alter the orbits of the planets, as to arrest society in its destined course. Nevertheless, there is something left for mortals to perform. But it is well for us to consider what can, and what cannot be done; and not to waste in the vain endeavour to arrive at impossibilities, those efforts which might be directed to objects which are really within our reach. If our sphere of action be limited, still within that sphere much good may be accomplished; we may promote the improvement of existing institutions, so as to render those that are useful more useful still, while we get rid of others whch are actually mischievous; and we may help to disseminate the true principles of social economy, such as prudence, forethought, and a spirit of independence in some classes of the community, among whom those principles are too generally ignored at the present time.

ADDRESS

ON TAKING THE CHAIR AS

PRESIDENT OF THE ROYAL SOCIETY.

DECEMBER 9, 1858.

GENTLEMEN,—Although I have already had the opportunity of offering to you my thanks for the great honour which you have conferred on me in placing me in this Chair, it is but fit that I should repeat them now, when we are assembled in a more formal manner, and when probably some Fellows are present who were not present at the Anniversary dinner. It is impossible that I should be otherwise than highly gratified by such an expression of the good opinion of a Society, which may justly be regarded as including a larger proportion of individuals distinguished for their knowledge and intelligence than any other in this country. At the same time I must own that my feelings on the occasion are somewhat modified when I see around me so many of our Fellows who have devoted their lives to scientific pursuits, and who in their respective departments have contributed so much more than I have done to the advancement of scientific knowledge. It is now long since the requirements of an arduous profession, and the public not less than the private duties belonging to it, compelled me to direct my attention to other objects, and in a great degree to relinquish those researches to which during many previous years I had been able to devote a large portion of my time, and which were to me the chief objects of interest during the early period of my life. Still, although I have ceased, except to a limited extent, to be a labourer in that field of science in which I laboured formerly, I have never failed to sympathise with those who in this respect were more happily situated, and to regard with satisfaction, or I ought rather to say with admiration, the grand results at which they have arrived in extending the boundaries of human knowledge.

If it were possible for any one of that small but illustrious band of philosophers—who just two centuries ago were associated in Gresham College for the purpose of mutually communicating and receiving knowledge, and who there laid the foundation of the Society which is now assembled—to revisit the scene of his former labours, we may well conceive the delight which it would afford him to learn that the success of that noble enterprise had been so much greater than his most sanguine aspirations could have led him to anticipate. Not only would he find an ample development of sciences which were then in the embryo state of their existence, but he would find other sciences, not inferior to these in interest and importance, added to the list. He would find that, instead of a limited number of individuals who were then occupied with scientific inquiries, whose labours were held in little estimation by the general public, and even held to be objects of ridicule by the presumptuous and ignorant, there is now a large number devoted to the same pursuits, and successfully applying to them the highest powers of the human intellect. He would perceive that, instead of being confined as it were to a corner, the love of knowledge is gradually becoming extended throughout the length and breadth of the land; and that, of those whose position does not afford them the opportunity of penetrating to the inmost recesses of the temple of science, there are many who, having advanced as far as the vestibule, are enabled even there to obtain their reward, in the improvement of their own minds, and in being rendered more useful members of the community.

Now, to say that all that has been accomplished as to the cultivation of science in this country during the last two centuries is to be attributed to the Royal Society, would be an absurdity. As, in now far-distant times, the course of events led the ancient nations, first of Greece and afterwards of Rome, to the cultivation of literature, of moral philosophy, of geometry, and of the fine arts; so, in these latter times, the course of events, taking another direction, has led the nations of Europe to the investigation of the physical sciences. The Royal Society has been one of the results of this movement; but being once established, it became itself a cause, and has been a most powerful and efficient instrument for the carrying on, and giving a right direction to, the movement in which it had itself originated. It has been the means of bringing those who have the same objects in view into communication with each other; and we all know how the interchange of knowledge and opinions, and the spirit of emulation, tend, at the same time that they increase the energy and activity of the imagination, to correct and mature the judgment. Nor should we overlook the fact, that the institution of the Royal Society has always afforded an honourable distinction for those whose labours have contributed to build up the fabric of human knowledge—a distinction which has this peculiarity, that it can never be obtained through favour or interest, while the selection of candidates for the Fellowship is as carefully and impartially conducted as is the case at present.

Among the portraits which we see around us is one of the Sovereign who granted us the charter by which we are incorporated, and who conferred the title of Royal Society on us. Whatever defects posterity may have discovered in the character of King Charles the Second, we are bound to express our obligations to him, not only for the charter which we hold, but for the real interest which he seems to have taken in our Society when it was yet in its infancy, and for the attention which he paid to it during the early period of his reign, at a time when the patronage of the Crown was of so much the greater importance, as there were but few among the public who sympathised with the new association in its pursuits, or were capable of estimating the objects for which it was established. Nor did His Majesty merely grant us a charter, but it was one especially suited to the genius and character of the English people. When nearly forty years afterwards the Académie des Sciences was founded by King Louis the Fourteenth, it was placed wholly under the dominion of the

Crown. The number of its members was limited: those belonging to one of its sections received pensions from the State; and when a vacancy occurred in any of the sections, it was necessary that the election of the new member should be confirmed by the Crown. Now we must not find fault with the constitution of a Society which has earned for itself so lofty a reputation; including in the list of its members the names of the most profound philosophers, and the greatest geniuses of the age, and of whose works all who are engaged in the pursuit of knowledge are justly proud; but we cannot doubt that with us such a constitution, so different from that of every other corporation in this country, would have been very much less successful than that which we actually possess. The charter of the Royal Society leaves the management of its affairs entirely in the hands of the Fellows, without the interference of any higher power. No one, in virtue of his belonging to it, receives any pension or derives any other advantage from the Government, and our funds are supplied altogether by ourselves. The sum of 1000*l.*, for some time past, has been annually voted by Parliament for the promotion of science. The Royal Society have undertaken the task of suggesting to the Treasury the manner in which this may be most usefully and economically distributed, the duty of accomplishing this object being devolved on a committee especially appointed for that purpose. But from this Parliamentary grant the Royal Society derives no special advantage, it being applied indifferently, for the purpose of supplying apparatus or other means of carrying on scientific inquiries, whether these inquiries belong to their own Fellows or to other persons. Being thus independent of the powers by which the State is governed, and having no other object than that of observing the physical phenomena of the universe, and tracing the laws by which they are regulated, the Royal Society has always pursued its course free from political excitement, and beyond the influence of anything in the shape of party politics. The effect of this has been not to sever the connection which ought to exist between an institution of Royal foundation and the State, but to cause that connection to manifest itself only by mutual exchange of good offices. The Royal Society has been always ready to lend its assistance to the Government whenever they required it, either in the way of giving their opinion on scientific questions, or in that of carrying out any public work; and I may add, that thus they have been enabled, not in a few, but in numerous instances, to render good service to the community; while, on the other hand, they are indebted to the Government, first, for the apartments in Somerset House, formerly allotted to them by King George the Third, and now for the more ample accommodation granted to them by Her present Majesty.

When the Royal Society was first established, there was no other Society devoting itself to the pursuit of any branch of knowledge; and hence it was that many communications were made on subjects not strictly belonging to those sciences, to which it was intended that their attention should be more especially directed. If we refer to their earlier publications, we find in one of them a scheme for a universal alphabet; in another, a dissertation on the Chinese language. Father Gaubil, a missionary belonging to the order of Jesuits, sends them a map of Pekin, with an exact account of the imperial palace. An English merchant gives a history of his journey to Aleppo and Tadmor; others describe the discovery of tessellated pavements and other Roman antiquities. In short, there is scarcely any one department of knowledge, whether it be philology, history, antiquities, medicine, geography, political economy, and even metaphysics, which is not to a greater or less extent represented in the 'Philosophical Transactions.' But all this time knowledge of all kinds was rapidly increasing, *vires acquirens eundo.* The time arrived when a division of labour was required, and the Royal Society discovered the necessity of confining themselves to their more legitimate pursuits. In the year 1717 the institution of the Society of Antiquaries attracted one large class of communications from them. After an interval of seventy years, the Linnean

Society was founded for the cultivation of natural history; and I need not enumerate the various other societies which have been since called into existence, and which are now pursuing their course, not as rivals of the Royal Society, but as co-operators with it in the great work of exploring the phenomena of the universe. Whatever may have been the apprehensions which some may have entertained formerly, the event has proved that these new institutions have in no degree interfered with the reputation and usefulness of that from which they derived their origin. Indeed, without such fellow-labourers as these it is difficult to understand how, in the present state of knowledge, the Royal Society could have met the expectations of the scientific portion of the community. There would have been no means of recording a vast number of valuable details, from which important conclusions may be drawn in after times. At the same time, we need only refer to the volumes of the 'Philosophical Transactions,' published since the beginning of this century, to be satisfied that the disposition to communicate the higher class of investigations to the Royal Society is not less than formerly. It is, indeed, the interest of everyone who is ambitious that his name as a discoverer should be transmitted to posterity, that his works should have a place in the 'Philosophical Transactions,' where, as has been observed by a writer in the 'Edinburgh Review,' 'he has the benefit of the great name acquired by that distinguished body, by the labours of Newton and Halley and Cavendish, and by two centuries of constant services performed to the commonwealth of letters.' *

With the exception of the achievements of those small communities of ancient Greece, to whose works we still refer as affording the highest standard of excellence in literature and the fine arts, and from whom has been transmitted to us that marvellous science of geometry which enabled Newton to unravel the system of the universe—with this exception, there is nothing in the history of what belongs to the advancement of knowledge so remarkable as the progress which the European nations have made

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* Edinburgh Review, 1811.

in the cultivation of the physical sciences during the last two hundred years. It is not only those who are engaged, as you are, in researches of this kind, that must contemplate with satisfaction the results of this movement. The moral philosopher, recognising in the desire of knowledge one of the noblest of our aspirations, will regard the extension of that desire, and the more general diffusion of knowledge, as an important means of elevating our species in the scale of intellectual beings. The unprejudiced theologian will allow that there is no better foundation for the religious sentiment than the study of natural phenomena, opening as it does to our view everywhere examples of design, and of the adaptation of means to ends, combined with mighty power and benevolent intention. The philosophical statesman, who, contemplating the progress of society, endeavours to explain the changes which it has undergone, and thence to anticipate the future, cannot fail to perceive that the cultivation of the physical sciences has been in these later times one of the most important instruments of civilisation; while the mere utilitarian, however little he may be capable of estimating knowledge for its own sake, must admit that it has contributed more than anything else to the comforts and conveniences, not of one order only, but of every order of the community, from those who dwell in palaces to the tenants of cottages and garrets. I need not occupy your time by adducing particular instances of the benefits to which I allude; and indeed they are so obvious, that I should not have thought it worth while to allude to them at all, if it were not that they show how complete a refutation the lapse of time has afforded of the views of those short-sighted cynics, among whom I am sorry to include even so distinguished a person as the author of 'Gulliver's Travels,' who formerly opposed or ridiculed the Royal Society, as if it were engaged in trifling pursuits of no advantage to mankind.

Science has already arrived at great results, far beyond what could have been reasonably anticipated. But the inquisitive mind, looking into the future, will find reason to believe that if we could lift up the veil by which it is concealed, we should find that there are other and still greater results reserved for those who will come after us, and which even some of those who are now among us may live long enough to witness. Astronomy has been said to be the most perfect of all the sciences; and some time since it might have been supposed that, as regards it, we had not the power of carrying our researches much further. But the observations of Lord Rosse, penetrating by means of his improved telescope into the more remote regions of space, have enabled him to determine the nature of the so-called nebulous matter, and to enter on a new order of inquiries respecting the construction of the universe. The needles which now vibrate in the magnetic observatories which have been established in different regions of the earth, under the direction of the Treasurer of our Society, have already not only made us acquainted with many important facts connected with terrestrial magnetism, but have disclosed to us some remarkable relations between the earth and the sun, of which we had no conception previously. But these magnetic observations are still in progress, and if not prematurely brought to a conclusion, it would be unreasonable to doubt that they must lead to still more important discoveries as to the operation of a force, which, probably like that of gravity, pervades the universe, and places even the most distant parts of it in connection with each other. A Fellow of our Society—devoting to it his time, his fortune, and his intellectual powers—is in a fair way to attain the great object of his life, in the construction of an arithmetical engine of far superior capabilities to any previously invented by himself or others; such as may not only be a lasting monument of profound mathematical knowledge, of inventive genius, and of that perseverance amid difficulties which is one of the highest attributes of genius; but may be of great use to mankind hereafter, by solving with unerring certainty problems which practically are in any other way beyond the reach of the human intellect.

It is merely because it happened that they first occurred to me, that I have adduced these instances of investigations which are now going on, but of which the principal results remain to be worked out hereafter. I need not tell you that analogous instances might be furnished from almost every department of knowledge. If we add to these the number of investigations of a more limited kind, each complete within itself, which every year produces, also bearing in mind how great an influence the cultivation of the physical sciences during the last century has exercised on our social system, and how much it has contributed to give to modern civilisation its peculiar character, we may well ask, what may not be the effect of a continuance of the same spirit of inquiry during the century which is to come? In considering such a question, it must be remembered that, whenever any addition has been made to the general stock of knowledge, the practical application of it to the ordinary purposes of life, for the most part, is made not immediately, nor until a long time afterwards. In the year 1739, the Rev. Dr. Clayton, at that time Dean of Kildare, communicated to the Royal Society his experiments on the distillation of coal, and his discovery of what he called 'the spirit of coal.' This spirit he confined in bladders, and occasionally diverted his friends by puncturing one of them near a candle, thus exhibiting a bright flame which issued from the puncture, until the whole of the spirit in the bladder was exhausted. Now the application of this discovery seems, as we see it now, to have been sufficiently obvious, yet nearly sixty years elapsed before Mr. Murdoch was led to avail himself of it for the purpose of lighting a factory in Manchester. In the year 1800, Volta, following up the researches of Galvani, discovered the effect which the multiplication of metallic plates has of increasing the electric force. About five years afterwards Davy began that grand series of experiments, in which he succeeded in decomposing the alkalies and earths by means of an apparatus similar to that invented by Volta, but of larger extent and greater power. But very many years yet elapsed, and many improvements and modifications of the battery had been effected, before the same method was made use of for the purpose of electro-plating. Early in the present century, Davy published an account of the effects produced on the nervous system by the respiration of the nitrous oxide. It was afterwards ascertained by physiologists that the respiration of the vapour of ether operates in a similar manner, symptoms, like those of intoxication, being followed by a temporary loss of sensibility. But it was still many years afterwards that it first occurred to a dentist in America that the respiration of ether might be employed for the purpose of producing insensibility to pain during surgical operations. The time may often be long deferred, but our experience warrants the assertion that there are very few of the discoveries which have been made in the physical sciences which have not, sooner or later, directly or indirectly, had the effect of promoting the well-being, the convenience, and comforts of mankind. As it has been hitherto, so we may expect it to be hereafter. In the meanwhile, the Royal Society, gathering to itself those who are most eminent as cultivators of any branch of natural philosophy, has no small share of responsibility, and has important duties to perform. It may encourage the deserving; it may lend a helping hand to those who want it; it may, as it always has done, render assistance to the Government where such assistance is required. Nor am I arrogating too much for the Royal Society when I say that it has still another function, which it even now exercises, not less substantially and really because the Fellows of the Society are themselves unconscious of it. Of the value of knowledge I apprehend that few at the present day will venture to express a doubt. But in all ages much of that which has been given to the world as knowledge has been no knowledge at all; and from this evil even the present age, in spite of the efforts made for the improvement of education, is not exempt. An institution such as ours is in this respect a great safeguard to the public. Here individuals engaged in pursuits which require accurate observation and cautious induction, are brought more or less into communication with each other. Mistakes as to matters of fact, and too hasty conclusions, are alike corrected. Though not in any regular and formal manner, whatever is put forth under the pretence of it being knowledge, is submitted to a competent tribunal, whose decisions silently and imperceptibly pervade general society, and go far towards exposing the shams and impostures of the day.

But I feel that I am occupying too large a portion of the time which belongs to this evening's meeting, and that I owe you my apologies for doing so. Allow me, however, to make one more observation, which will, I feel sure, have the cordial assent of everyone who hears me; namely, that it is desirable that the Royal Society should persevere in the independent course which it has hitherto pursued, relying on its own character and on the exertions of its Fellows, seeking no adventitious aid, and satisfied with the conviction that no one can labour in the acquirement of knowledge without, sooner or later, rendering service to mankind.

ADDRESS

AT THE

ANNIVERSARY MEETING OF THE ROYAL SOCIETY

November 30, 1859.

Gentlemen,—In an address lately delivered at a Meeting of the Society for the Promotion of Social Science, a noble Lord, a Fellow of this Society, called the attention of his hearers to the advantages which the world in general had derived from the cultivation of the physical sciences. No one indeed can be better qualified to give an opinion on this subject than the distinguished individual to whom I have alluded. His first communication to the Royal Society was in the year 1796, and was published in the 'Philosophical Transactions' for that year. From that time to the present day he has, without any intermission, laboured for the advancement of all kinds of knowledge, and so he still continues to labour with all the determination and energy and intellectual vigour of youth; and I may confidently affirm that little has been done worthy of note during this interval of sixty-four years which has escaped his acute observation. The influence, however, which the physical sciences have had in adding to the conveniences and comforts, and advancing the material prosperity of mankind is too obvious to escape the notice of a much less close observer than Lord Brougham. If our houses and our cities are better and more economically lighted; if our population is better and more cheaply clothed; if our fields are more productive; if we travel by steam and communicate with those who are hundreds of miles distant from us by the telegraph; if a brighter light shines in our light-houses to guide the mariner at night; these and a thousand of things besides are but the result of the application by practical men of the discoveries made in the physical sciences to practical purposes. To the same cause may be attributed much of the political greatness of the British nation. The British flag floats in every sea; our colonies are established in every region of the earth; we contemplate in them with a reasonable pride the germs of future nations, which, when our fortune may possibly be changed, will speak the same language with ourselves; inheriting our literature, our political institutions, and not only our religion but our religious freedom; inheriting also our knowledge, and adding knowledge to it; but none of this could have been, if it were not that the astronomer had instructed the sailor how, with nothing but the heavens above him and the waters on every side, he may find his exact position on the surface of the globe.

But it would be a grave mistake to suppose that such as those which I have now enumerated are the only advantages which have been derived from the cultivation of the physical sciences. To know their full extent, we must take into the account not only the direct but also the indirect results to which it has led; and I trust that I may be excused if, on the occasion of the present anniversary, I occupy some portion of your time, not by an elaborate discussion of the subject, but by offering to you some suggestions as to the other ways in which inquiries such as those in which you are yourselves engaged have already affected, and may be expected still more to affect hereafter, the habits, the modes of thought, the fortunes and moral condition of mankind.

It is not our business to depreciate that form of civilisation which existed in times long since past, and especially of that remarkable people who, during some centuries before and after the Christian era, were distinguished for their still unrivalled excellence in art—their noble literature; when Aristotle sat at the feet of his master Plato; when students in search of intellectual improvement from all parts of Greece resorted to the Lyceum of Athens; when from opposite quarters of the Mediterranean Sea the Greek colonies of Alexandria and Syracuse supplied a list of mathematicians and poets to add lustre to their parent state. Neither let us forget what we owe to another people, whose civilisation is to be measured, not by their wealth and luxury, their ambition and their conquests; but by those monuments of art which still draw visitors to Rome; their historians, moral philosophers, and poets. But, great as are the obligations which we owe to these nations of antiquity, it cannot be denied that the civilisation which exists among us at the present time is of a higher order than that which existed formerly; and it is not difficult to show that it is to the greater extension of a knowledge of natural phenomena, and the laws which govern them, that this improvement is mainly to be attributed.

Knowledge and wisdom are indeed not identical, and every man's experience must have taught him that there may be much knowledge with little wisdom, and much wisdom with little knowledge. But with imperfect knowledge it is difficult or impossible to arrive at right conclusions. Many of the vices, many of the miseries, many of the follies and absurdities by which human society has been infested and disgraced may be traced to a want of knowledge. It was from a want of knowledge that Roger Bacon was persecuted by the Franciscan monks, and Galileo by the Inquisition; that Servetus was burned by Calvin; while others would have burned Calvin in his turn if they had had the opportunity of doing so. So it was that juries were found to convict and judges to condemn poor ignorant women as witches; that within the last two centuries well-educated men believed that they might read their destiny in the stars; and that as lately as the year 1638, on the occasion of the birth of Louis XIV., Richelieu compelled the dungeons of the Inquisition to give up the astrologer Campanella, in order that he might cast the horoscope of the future king; and so it is that at the present day grown-up ladies and gentlemen occupy themselves with the humbler and less romantic mysteries of turning and rapping tables. Co-operating with a purer religious faith, the advancement of knowledge has humanised our institutions. It has banished slavery; it has caused our laws to be more merciful, and the administration of them more just; it has promoted religious and political freedom, and, with one or two miserable exceptions, it has rendered even despotic governments more attentive to the claims and wishes of their subjects. If sanitary and other improvements (these being the results of greater knowledge) have added to the average length of human life, be it observed that this fact includes another fact, namely, that they have added to human happiness; for true it is that the causes which tend to the shortening of life are, with few exceptions, such as produce either physical pain or moral suffering.

The investigation of the physical sciences is especially favourable to the training of some of the more important faculties of the mind, so that we may well anticipate much ultimate advantage from the movement which is already begun, having for its object, not to supersede these studies of ancient languages and ancient literature (which at the present time, in addition to mathematics, are supposed to form the staple of a first-rate education), but to add an elementary knowledge of the principal physical sciences to the list. The including of some of these at least in the instruction of early life will operate beneficially in various ways. The first step in all physical investigations, even in those which admit of the application of mathematical reasoning and the deductive method afterwards, is the observation of natural phenomena, and the smallest error in such observation in the beginning is sufficient to vitiate the whole investigation afterwards. The necessity of strict and minute observation, then, is the first thing which the student of the physical sciences has to learn, and it is easy to see with what great advantage the habit thus acquired may be carried into everything else afterwards. Slovenly habits of observation are indeed the source of the large proportion of the evils which mankind bring upon themselves; of blunders in private life by which an individual causes the ruin of himself and his wife and children; of blunders in statesmanship which bring calamities on nations. It is to these, moreover, that impostors and fanatics of all kinds and in all ages have been indebted for their influence and success.

It would be easy to show how in various other ways the study of the physical sciences cannot fail to be a useful training for the mind. Very much indeed might be said on this subject, but to enter fully into it would not only occupy too much of your time, but would involve us in a metaphysical discussion unsuited to the present occasion. There are, nevertheless, two or three points to which I shall venture, however briefly, to allude.

Investigations of this kind, more than almost any other, impress the mind with the necessity of looking carefully at both sides of a question, and strictly comparing the evidence on one side with that on the other; and in this manner they help to correct and improve the judgment. As in every such investigation classification is an important and indeed a necessary element, another effect is that of promoting and strengthening the best kind of memory;—a memory founded on some actual relation of objects to each other, and not on mere apparent resemblance and juxtaposition. Lastly, physical investigations more than anything besides help to teach us the actual value and the right use of the imagination; of that wondrous faculty which, left to ramble uncontrolled, leads us astray into a wilderness of perplexities and errors, a land of mists and shadows; but which, properly restrained by experience and reflection, becomes the noblest attribute of man; the source of the poetic genius; the instrument of discovery in science, without the aid of which Newton would never have invented fluxions, nor Davy have decomposed the earths and alkalies, nor would Columbus have found another continent beyond the Atlantic Ocean.

In the pursuit of the physical sciences, the imagination supplies the hypothesis which bridges over the gulf that separates the known from the unknown. It may be only a phantom; it may prove to be a reality. But, as these sciences relate to matters of fact which, if not directly, may be made indirectly cognisable by the external senses, they afford us peculiar facilities, far beyond what exist in other departments of knowledge, of testing the accuracy of the views which the imagination has suggested, so that we may at once determine when it has been too excursive, and, if it has been so, call it back to its right place. There may be instances of mere accidental discovery; but, setting these aside, the great advances made in the inductive sciences are, for the most part, preceded by a more or less probable hypothesis. The imagination, having some small light to guide it, goes first. Further observation, experiment, and reason follow. Thus, for example, it had been long suspected that there is some sort of relation between electricity and magnetism. Much thinking on the subject had strengthened this suspicion in the mind of Oersted. Still it was but an hypothesis, and might even now have been regarded by many as no better than a dream, if it had not been that in the year 1820 the Danish philosopher devised the experiments which demonstrated the law of reciprocity between an electric current and the magnet, and the identity of the two forces. As an instance of an opposite kind, I may refer to the doctrine of phlogiston as propounded by Stahl. While the art of chemical experiment was imperfectly understood, that doctrine was very generally received as affording a true explanation of the phenomena of combustion. But no sooner had Lavoisier and his friends introduced a more accurate mode of experiment by weight and measure, than it was proved to have no foundation in reality, and consigned to the same place in the history of science with epicycles and vortices and animal spirits.

But the effect of some kind of instruction in the physical sciences being recognised as an essential part of a liberal education, may be contemplated under another point of view. Except in the case of particular professions or occupations, a profound knowledge of these subjects is not required; but there is no situation in life in which some knowledge of them may not be turned to a good account. Is there any country gentleman or farmer who might not derive advantage from knowing something of vegetable physiology and chemistry?—would not a knowledge of scientific botany make a man a better gardener?—is there any county magistrate, or mayor, or alderman of a borough, to whom it would not be useful to know something of the principles on which what are called sanitary measures are to be conducted?—and is there anyone in any situation in life to whom it would not be a benefit to know something of animal physiology, of the functions of his own body, and of the influence which his bodily condition exercises over those moral and intellectual faculties by which he is distinguished from the rest of the animal creation? If it did not teach him how to cure disease, it might be useful for him to know how far disease may cure itself, and what are the limits of Nature in this respect? To man, looking at him as an individual, there is no art so important as that of understanding and managing himself—an art so simply and well expressed by the two significant words Γνῶθι σεαυτὸν, which were inscribed over the heathen oracle of Delphi. To correct bad habits when once acquired is no very easy task. A strong sense and a strong will, such as only a limited number of persons possess, are necessary for that purpose. But it would go far towards preventing the acquirement of such habits, if young persons, during the period of their education, were made to understand the ill consequences to which they must inevitably lead, and how, eventually, the body must suffer and the mind be stupefied and degraded, not by the reasonable indulgence, but by the abuse of the animal instincts.

In the Introduction to his 'Inquiry into the Human Understanding,' David Hume, having referred to the remarkable progress which had been lately made in a knowledge of astronomy and other physical sciences, has suggested that 'the same method of inquiry, which has been applied with so great advantage in these sciences, might also be applied with advantage to those other sciences which have for their object the mental power and economy.' I call your attention to this remark, because it brings me to the consideration of another subject, namely, the influence which the pursuit of the physical sciences, conducted as it has been more or less since the days of Galileo and Kepler, has exercised over other studies, and in the advancement of other kinds of knowledge. It needs no argument to prove, for it must be sufficiently plain to everyone, that other sciences as well as the physical have at the present time a very different character from that which they had formerly. It was probably from the operation of various causes (a principal one, however, being the too exclusive and undue importance attached to the Aristotelian logic in the schools) that some centuries had elapsed since the revival of learning before the inductive method (which, by the way, is nothing more than the logic which we all make use of instinctively in the ordinary concerns of life) became generally applied to the investigation of the phenomena and laws of the material universe. But a still further time elapsed, even after the publication of Lord Bacon's views on the subject, before other sciences began to partake of this movement; and when they did so, it seems not possible to doubt that it was the result of the impulse which the rapid growth of the physical sciences had communicated to them.

That such was the opinion of David Hume as to the influence thus exercised on one class of inquiries in which he was himself engaged, I have already shown. But long before Hume wrote, the same impression had existed on the mind of Locke, as will be sufficiently obvious to anyone on reading the Introductory Chapter of his 'Essay on the Human Understanding.' In fact, Locke had originally directed his attention to Natural Philosophy and Medicine, and his researches in Moral and Intellectual Philosophy were engrafted on his earlier studies. So, in the case of Dr. Berkeley: his treatise on 'Vision' contains the essential part of those doctrines which he afterwards published in his 'Treatise on the Principles of Human Knowledge;' and it is easy to see how, step by step, these gradually arose out of his former studies of Natural Philosophy. I make no reference to the modern German school of metaphysicians, and indeed am quite incompetent to do so. Neither do I refer to another order of metaphysicians, one of whom informs us how ideas and emotions and volitions are produced by big and little vibrations of the molecules of the nervous system; while another undertakes to explain 'the action of material ideas in the mechanical machines of the brain.' But with regard to the more eminent of our English writers on these subjects, and what has been called the Scotch school of metaphysicians, including Reid, Adam Smith, Dugald Stewart, and Brown, it may be truly asserted that the advantage which they have had over the dreamy metaphysicians of former times is to be attributed to their having in their mode of inquiry followed the example which had been set them in the study of the physical sciences.

I must not exhaust your patience by going on to explore so wide a field as that on which I have just entered. The subject is one to which justice cannot be done without a much more ample discussion than would be convenient on an occasion like the present. All that I shall say besides may be comprised in a very few words. In composing his 'Essays' on what is now called 'Political Economy,' we may presume that David Hume's mind was influenced by the same considerations as when he composed those other Essays to which I have alluded; and it is not too much to say that these researches of Hume's may be regarded as having, more than anything besides, contributed to lay the foundation of that vast science which has been since developed through the labours of Adam Smith and Horner, and of others who are still alive among us.

At the same time, in giving this credit to Hume, we must not overlook what is due to one of our own body, and an original Fellow of the Royal Society. Sir William Petty contributed several papers to the 'Philosophical Transactions.' In an early part of his life he had been engaged in giving lectures on Anatomy and on Chemistry at Oxford, and, his mind having been thus prepared, he entered on the consideration of other subjects, such as taxation and trade, as affecting the material prosperity of nations, and social statistics. His 'Discourse on Political Arithmetic' seems to have been the last result of his labours, it having been first published after his death by his son, Lord Shelburne. In his preface to this Discourse he thus expresses himself, and I quote the passage because it will serve to show how in these later investigations his mind was influenced by those in which he had been previously engaged:—'The method I take to do this is not very usual: for, instead of using only comparative and superlative words, and intellectual arguments, I have taken the course (as a specimen of the political arithmetic I have long aimed at) to express myself in terms of number, weight, or measure; to use only arguments of sense, and to consider only such causes as have visible foundations in Nature.'

It would be easy to adduce from other sciences analogous illustrations of the proposition which I have ventured to advance. Compare the natural theology of Derham, Paley, and the Bridgewater Treatises, all founded on the observation of natural phenomena, with the speculations of the ancient philosophers, or with the abstractions and *à priori* arguments of Dr. Samuel Clarke. Compare the unravelling of early history by Niebuhr and Arnold with anything regarding history that had been done before, or the best practical treatises on politics and government of modern times with the elaborate but fantastic scheme of Plato's republic.

If I have made too large a demand on your patience by dwelling on matters which have no special or exclusive relation to our body, you will, I hope, accept it as a sufficient apology that I have done so under the impression that whatever relates to the advancement of knowledge generally, cannot be altogether uninteresting to those who are the living representatives of the great men by whom the Royal Society was founded, and who themselves now constitute the most ancient scientific institution in the world.

Looking at what more particularly concerns ourselves, I may congratulate you on the results obtained during the last year. In the volume of the 'Philosophical Transactions' which is now in the course of publication, we find that there is scarcely any department of physical knowledge which is not honourably represented; at the same time that, besides the abstracts of the principal papers, many investigations which have not been deemed to be of sufficient importance, or sufficiently original to have a place in our annual volume, but which, nevertheless, are of considerable interest, are recorded and published from time to time in the smaller volume bearing the title of 'The Royal Society's Proceedings.' By means of this less pretentious publication many facts, many thoughts and suggestions are preserved, which might otherwise have been neglected or lost, but which, being thus preserved, may prove to be of much value hereafter. Our weekly meetings have been well attended, and have been rendered more attractive by a practice which is not altogether new, but which has been more generally adopted than heretofore during the last Session; I allude to that of the authors of papers communicated to us giving an oral or *vivâ voce* explanation of their contents; those explanations being rendered more intelligible by a reference to diagrams, or to the apparatus used for experiments, and even by experiments actually displayed. Such illustrations are useful both to the authors and to others, by causing the subject-matter of the several communications to be better understood; and they are useful in another way, inasmuch as they lead to conversations and discussions, and to the interchange of opinion at the time, from which we may all of us derive something to think of, and reflect on afterwards.

Having occupied so much of your time already, I do not feel justified in making a further demand on it by entering into a recapitulation of what has been done in the way of scientific discovery during the last year. There is, however, one subject to which I am led to advert, because it is of more than usual interest, not only on account of its connection with scientific investigations but also on other grounds.

After an interval of two years, Captain M'Clintock and those who were associated with him have returned in safety from their voyage of discovery, and their investigations in the Arctic regions. The result has been that, although our most earnest wishes have not been realised, it cannot be said that our more reasonable expectations have been disappointed. There seemed to be no more than a small probability that any of those who accompanied Sir John Franklin when he quitted his native country in the year 1845 should be still alive in the dreary and inhospitable regions in which, after the loss of their vessels, they had been imprisoned. Captain M‘Clintock's careful inquiries have fully dissipated whatever faint hopes might have been entertained of its being otherwise, leaving us only the poor consolation of knowing that the sufferings of these gallant spirits are at an end.

As scientific discoverers, Captain M‘Clintock and his officers have well fulfilled their mission, as is proved by the magnetic observations which Captain M‘Clintock has already communicated to the Royal Society, and of which General Sabine, with his usual perspicuity, gave us some account at one of our evening meetings.

In speaking of those engaged in the late expedition, I am unwilling to pass over in silence the name of Mr. Young, who, having been the commander of a merchant ship, took so much interest in the projected enterprise, that he not only contributed 500*l.* towards defraying the expenses of it, but volunteered his personal services on the occasion, by acting as master of the vessel. Nor ought I to omit to notice the name of Dr. Walker, who, being engaged as surgeon, acted also as naturalist to the expedition, and availed himself of such scanty opportunities as those ice-bound countries afford, of extending his researches in natural history. Of the results which he has been able to obtain I am not in a condition to give you an account at present; but they will, I doubt not, in due time, be communicated to the public.

The greatest honour which the Royal Society has to bestow, namely the Copley Medal, has been awarded to Professor Wilhelm Edward Weber of Göttingen, foreign member of the Royal Society, for his investigations contained in the ‘Maasbestimmungen’ and his other researches in electricity, magnetism, acoustics, &c.

The first work in which Professor Weber was engaged, was ‘The Theory of Undulations,’ published in conjunction with his brother Ernest in 1825. This work is still one of standard authority. It contains not only a complete account of all that was previously known on the subject of waves in water, but is the repository of many original and important experiments throwing light on this subject. The volume contains also many valuable investigations in acoustics. Subsequently to this, Professor Weber communicated to Poggendorff's 'Annalen' numerous memoirs containing his further observations in acoustics, among which were his experiments on the longitudinal vibrations of rods and strings; on reed organ pipes; on grave harmonic sounds; and also his method of determining the specific heat of bodies by their sonorous vibrations. In this department of physical science he has been a worthy coadjutor of Chladni and Savart.

In association with his brother Edward, then Anatomical Prosector in Leipsic, he in 1835 published the details of an anatomical, physical, and mathematical investigation of the mechanism of the human organs of locomotion, one result of which was the promulgation of a theory of animal progression more nearly in accordance with observed facts than any that had been proposed previously.

On his association with M. Gauss in the Magnetic Observatory at Göttingen, Professor Weber devoted himself almost exclusively to the subject of magnetism and electricity. The annual volumes of the 'Results of the Observations of the Magnetic Union,' published by these eminent philosophers between 1838 and 1843, contain the description of several new instruments, some of which have been the models of those which are now used in all observatories. They include also a great variety of important original researches.

It ought not to be omitted that the researches of Gauss and Weber with reference to the transmission of electric signals did more to excite attention to the practicability of an electric telegraph than anything that had been done previously.

In 1846 Professor Weber published a memoir on 'The Measures of Electro-dynamic Forces' ('Electrodynamische Maasbestimmungen'), a work not less remarkable for the original mathematical than for the experimental researches embodied in it. A high authority has pronounced this to be 'one of the most important works both with regard to mathematical theory, and the practical application of it, that has been published in this department of science since the researches of Ampère, and the same authority has added, 'His transformation of Ampère's law of electric action, so as to exhibit the analyses of the *plus* and *minus* elements in each stream, and his deduction thence of the law of statical from that of dynamical action seems to me, both as a specimen of mathematical analysis, and of physical philosophy, exceedingly beautiful.'

More recently Professor Weber has produced two additional memoirs on the same subject, one of which contains a mathematical and experimental investigation of the phenomena of diamagetism discovered by Faraday.

Professor Miller, As I have not the opportunity of presenting it to him in his own person, I request of you, as Foreign Secretary, to cause the Copley Medal which I now place in your hands to be conveyed to Professor Weber, with a request that he will be pleased to accept it as the indication of the very high estimation in which his scientific labours are held by the Royal Society of London.

One of the Royal Medals has been awarded to Arthur Cayley, Esq., F.R.S., for his Mathematical Papers published in the 'Philosophical Transactions,' and in various English and Foreign Journals.

From the first institution of the Royal Society a large proportion of the papers communicated to them have related to Pure Mathematics, and none have contributed more than these to maintain the credit of the 'Philosophical Transactions.' Among writers of the present time, no one has been a more earnest or more successful labourer in this department of science than Mr. Cayley. His numerous papers on these subjects bear testimony to his unwearied industry; and the undivided opinion as to their value and importance held by those who are best qualified to judge of them, sufficiently establishes Mr. Cayley's claim to be regarded as one of the most eminent and profound mathematicians of the age in which we live.

Mr. Cayley is among the foremost of those who are successfully developing what may be called the *organic* part of algebra into a new branch of science, as much above ordinary algebra in generality as ordinary algebra is itself above arithmetic. The effect is a vast augmentation of our power over the comparison and transformation of algebraical forms, and greatly increased facility of geometrical interpretation.

To give any full account of Mr. Cayley's labours would be impossible, from mere want of space; and such account, were it given, would be intelligible to none but the highest order of mathematicians; moreover, you are well aware, it could not come from my own knowledge of the subject. I have, however, considered it my duty to lay something before you, in the most general terms of description, about these very remarkable papers, obtained from those who are competent to describe them.

Mr. Cayley's memoirs relate almost exclusively to pure mathematics, and a considerable proportion of them belong to the subject Quantics, defined by him to denote the entire subject of rational and integral functions, and of the equations and loci to which these give rise; in particular the memoirs upon linear transformations and covariants, and many of the memoirs upon geometrical subjects, belong to this head. Among the memoirs upon other subjects, may be mentioned Mr. Cayley's earliest memoir (1841) in the 'Cambridge Mathematical Journal,' 'On a Theorem in the Geometry of Position,' which contains the solution in a compendious form, by means of a determinant, of Carnot's problem of the relation between the distances of five points in space; the memoir in the same Journal, 'On the Properties of a certain Symbolical Expression,' which is the first of a series of memoirs upon the attraction of ellipsoids, and the multiple integrals connected therewith; a memoir in 'Liouville's Journal,' which contains the extension of the theory of Laplace's functions to any number of variables; and the memoirs in the same two Journals, on the inverse elliptic integrals or doubly periodic functions. The earliest of the memoirs upon linear transformations was published (1845 and 1846) in the Cambridge and the Cambridge and Dublin Mathematical Journals, and under a different title in 'Crelle.' The antecedent state of the problem was as follows:—The theory of the linear transformations of binary and ternary quadratic functions had been established by Gauss, the same being in fact the foundation of his researches upon quadratic forms, as developed in the 'Recherches Arithmétiques,' and that of the linear transformations of quadratic functions of any number of variables, had been considered by Jacobi and others. A very important step was made by Mr. Boole, who showed that the fundamental property of the determinant (or, as it is now commonly called, discriminant) of a quadratic form applied to the resultant (discriminant) of a form of any degree and number of variables; the property in question being, in fact, that of remaining unaltered to a factor près, when the coefficients are altered by a linear transformation of the variables, or as it may for shortness be called, the property of invariancy: the theorem just referred to, suggested to Mr. Cayley the researches which led him to the discovery of a class of functions (including as a particular case the discriminant), all of them possessed of the same characteristic property. These functions, called at first hyperdeterminants, are now called invariants; they are included in the more general class of functions called covariants, the difference being that these contain as well the variables as the coefficients of the given form or forms. The theory has an extensive application to geometry, and in particular to the theory of the singularities of curves and surfaces. This theory for plane curves was first established (1834) by Plücker upon geometrical principles; the analytical theory for plane curves is the subject of a memoir by Mr. Cayley in 'Crelle,' and of his recent memoir in the 'Philosophical Transactions,' 'On the Double Tangents of a Plane Curve,' based upon a note by Mr. Salmon. The corresponding geometrical theory for curves of double curvature and developable surfaces, was first established in

Mr. Cayley's memoir on this subject, in 'Liouville' and the 'Cambridge and Dublin Mathematical Journal.' The theory for surfaces in general, is mainly due to Mr. Salmon. Among Mr. Cayley's other memoirs upon geometrical subjects, may be mentioned several papers on the Porism of the in-and-circumscribed polygon, and on the corresponding theory *in solido*; a memoir on the twenty-seven right lines upon a surface of the third order, and the memoir in the 'Philosophical Transactions,' 'On Curves of the Third Order.' The memoirs on Quantics in the 'Philosophical Transactions' (forming a series not as yet completed), comprise a reproduction of the theory of covariants, and exhibit the author's views on the general subject. Mr. Cayley has written also a Report on the recent progress of theoretical Dynamics, published in the 'Reports of the British Association' for 1857.

Mr. Cayley, In the name of the Royal Society of London, I request your acceptance of this Royal Medal, in testimony of the strong sense which they entertain of the value of your labours, and of the satisfaction which it affords them that so eminent a mathematician as yourself should be included in the list of their Fellows.

The other Royal Medal has been awarded to Mr. George Bentham, F.L.S., for his important contributions to the advancement of Systematic and Descriptive Botany.

The remarkable accuracy which distinguishes all Mr. Bentham's scientific researches, the logical precision that characterises his writings, and the sound generalisations which his systematic works exhibit, may be in a great measure traced to the influence of his uncle, the late celebrated legal theorist Jeremy Bentham, who directed much of his early studies, and under whose auspices he published one of his earliest works, 'Outlines of a New System of Logic.' His mind was further imbued in youth with a love of Natural History, and especially Botany; and this taste was cultivated and nourished by a study of the works of the elder De Candolle.

Fortunately for the cause of Botany in England, Mr. Bentham has devoted himself almost exclusively to that science; and to his excellent powers of observation, close reasoning, concise writing, and indefatigable perseverance, our country owes the distinction of ranking amongst its Naturalists one so preeminent for his valuable labours in Systematic Botany.

Amongst Mr. Bentham's numerous writings, those hold the first rank which are devoted to the three great natural orders, Leguminosæ, Labiatæ, and Scrophulariaceæ. These orders demanded a vast amount of analytic study; for they are amongst the largest and most widely distributed of the vegetable kingdom, and had been thrown into great confusion by earlier writers. They have been the subject of many treatises by Mr. Bentham, and especially of two extensive works, the contents of which have lately been embodied in the 'Systema Vegetabilium' of the De Candolles. On their first appearance these works secured for their author a European reputation, and will always rank high as models of skilful classification.

It would occupy too much time to specify the very numerous monographs and papers which Mr. Bentham has communicated to various scientific societies and periodicals in this country and on the Continent, and especially to the Linnean Transactions and Journal. That 'On the Principles of Generic Nomenclature' may be noted as an example of his power of treating an apparently simple, but really abstract and difficult subject in a manner at once philosophical and practical. Mr. Bentham's most recent work, that on British Plants, is the first on the indigenous Flora of our Islands, in which every species has been carefully analysed and described from specimens procured from all parts of the globe; it is distinguished for its scientific accuracy, advanced general views, and extreme simplicity—a combination of qualities which can result only from an extensive series of exact observations, judiciously arranged and logically expressed.

Mr. Bentham, The early volumes of the 'Philosophical Transactions' contain numerous papers relating to Botany and the other sciences which are usually comprehended under the general designation of Natural History. As these sciences, but especially Botany, became more and more extended, it was thought desirable that another Institution should be called into existence, which might share with the Royal Society the privilege of promoting the cultivation of them, and of communicating to the world from time to time the progress which has been made in this department of knowledge: and such was the origin of the Linnean Society in the year 1788. The Royal Society, however, does not on that account feel the less interest in this class of scientific investigations. It is accordingly with great satisfaction that the Council have awarded to you one of the Royal Medals, and that, in the name of the Society, I now place it in your hands, in testimony of their high appreciation of your researches, and of the respect which they have for you as a fellow-labourer in the field of science.

ADDRESS

AT THE

ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

NOVEMBER 30, 1860.

GENTLEMEN,—Since our last Anniversary, the Royal Society has continued to pursue its mission, and I hope that I may add, with no unsuccessful result. Papers of great importance have been given to the world in the last volume of the 'Philosophical Transactions;' and many others which are of much interest may be found in the lately-published numbers of our 'Proceedings.' This last publication has become a valuable addition to scientific literature, and, as such, has risen in estimation both in this and in foreign countries, beyond the expectation of those by whom it was originally suggested. The meetings of the Society have been fully attended; and the occasional dryness of scientific details has been not unfrequently relieved by the display of new experiments, and by discussions in which many of our Fellows have taken part, uninfluenced by any other desire than that of mutually giving and receiving information. The increasing number of candidates for admission into the Royal Society sufficiently shows how highly that honour is appreciated by the public; and I may take this opportunity of repeating an observation which I made formerly, namely, that this distinction, like those afforded by the Universities, is all the more valuable to those on whom it is conferred, inasmuch as it is one of the very few which cannot be obtained either by the favour of the great or through the partiality of friends. As the election of the Fellows is now conducted, it is barely possible that that honour should be on any occasion improperly bestowed. There can, indeed, be no doubt that the present mode of election has been a great improvement on that which had been adopted previously, and that it has very much contributed to maintain the honour and dignity of our Institution. I make this acknowledgement the more readily, because I must own that I was not a convert to the new system in the first instance, It was perhaps because I had been intimate with the Royal Society from a very early period of my life, that, when the change was first suggested, I was led to believe, in common with my friend Robert Brown and some other of the older Fellows, that it would have been better for us *stare super antiquas vias.* Experience has altered my opinion on the subject.

It would, however, be unworthy of us, as the living representatives of those great men by whom the Royal Society was founded, to consider the progress of the physical sciences only as it regards ourselves. Looking abroad into what is going on in general society, I am sure that there is no individual now present who is not gratified to find that there is a desire to become acquainted with natural phenomena and the laws which govern them, much beyond what existed even at the beginning of the present century; and that the opportunity of satisfying that desire, to a certain extent, is afforded to persons of every class, not only in the metropolis, but also in the provincial towns, and sometimes even in our villages, by means of Mechanics' and Literary Institutions, and by occasional lectures where no such institutions exist. As a part of the education of those who ought to be the best instructed members of the community, in our schools and colleges the study of the physical sciences has already taken root; and there is every reason to believe that the tree will grow and flourish.

In the address which I offered to you at our last Anniversary, I adverted to the influence which such studies must have in training some of the higher faculties of the mind; and I also adverted to the effect which they have already produced in laying the foundation of a better method of investigation in other departments of knowledge. It is not my intention to trouble you with a repetition of these observations: there are, however, some other points belonging to the same subject, to which I would willingly draw your attention.

In holding the opinion that much advantage would arise from the study of the physical sciences being regarded as an essential part of a liberal education, I apprehend that it has never entered into the mind of any person who has seriously reflected on the subject, that it should supersede those other studies which form the basis of such an education in this and others of the more highly civilised communities at the present day. One of these studies, indeed, namely mathematics, is necessary to the physical sciences themselves, there being no one of these sciences to which, under certain circumstances, mathematical reasoning may not be usefully applied; whilst one especially, and that the foremost and grandest and most important of the whole, is so entirely founded upon it, that if this were taken away, there would be very little of the science left. The languages of the ancient nations of Greece and Italy have no such direct relations to the physical sciences as mathematics; but I know no better method than that which the study of them affords of training the mind, at an early period of life, to habits of thought and attention, and so of fitting it for other studies afterwards. There is another advantage to be derived from those pursuits which lead us to a knowledge of the Greek and Roman classics. Greek and Roman literature has been the foundation of the best literature of modern Europe; and an acquaintance with it stores the mind of the youthful student with graceful recollections and noble thoughts, which may exercise a wholesome influence over him through all the rest of his life. Further, it may be observed that the study of the ancient languages is an excellent introduction to a knowledge of grammar, and of the use of language generally: and this knowledge is of a kind the importance of which cannot well be over-estimated; not only as it is by means of language that we are enabled to communicate our thoughts to each other and hand them down to those who are to come after us, but because language is in itself an instrument of thought, without which the reasoning powers which God has given us could be turned only to a very small account.

There is, indeed, no sufficient reason why the instruction of youth should be limited to one of these subjects, to the exclusion of the other, there being 'ample room and verge enough' for both; it being quite true, as has been lately observed in an address delivered at Edinburgh by a noble Lord, a Fellow of our Society, that what is wanted in education is not so much that a great deal should be learned of any one subject, as that whatever is learned should be learned thoroughly; so that the student should acquire the habit, so important in after-life, of undertaking nothing which he does not undertake in earnest. One object of education undoubtedly is to furnish the mind with knowledge which may be turned to good account hereafter. But that is not the only object. And there is always danger that, in exercising the faculty of learning over-much, the higher faculties of thought and observation may not be exercised sufficiently. There may indeed well be, for the higher order of minds, too much as well as too little of systematic education; and hence it is that for some of the greatest achievements in the way of scientific discovery, we are indebted to those who, like Sir Humphry Davy, were in a great degree self-educated.

It is a poor pedantry that would exalt one kind of knowledge by disparaging others. Literature, the arts, the moral and the physical sciences, all of these in their respective ways have tended to elevate the condition of mankind. But it is by the union of the whole that the greatest results have been obtained. That union is indeed as necessary to the higher forms of civilisation, as the combination of rays of different degrees of refrangibility is to the constitution of a beam of solar light.

Of the physical sciences, it may, I apprehend, be truly asserted that they have an advantage over every other department of knowledge—in this respect, that the field of inquiry is practically unlimited. The student may, indeed, meet with an impassable barrier in one direction; but in that case he has only to proceed in another. As he advances, the horizon which terminates his view recedes before him. He enters on fresh scenes, gathers in new knowledge; and every addition which he makes becomes the foundation of further knowledge, to be afterwards acquired; so that, at the end of a long life, he finds himself a learner still. In the meanwhile, under whatever circumstances he may be placed —whether he be in the cultivated valley, on the glaciers of the Alps, on the wide sea, in the crowded city, in the busy factory, in the broad sunshine, or in the starlight night—he has only to look around him to find objects which have to him a peculiar interest, exhibiting relations which are not perceptible to those whose minds have been otherwise engaged. While viewing the gorgeous sunset, he finds, in the changing colour of the clouds and in the dark-blue sky above, illustrations of the phenomena and laws of light. The flashes of the aurora are to him not mere objects of curiosity, but are associated with the magnetism of the earth—with that mysterious force which, like the force of gravity, connects us with the sun, and probably with all the other heavenly bodies, even those which are at the greatest distance from us. In the tumultuous movements of the atmosphere, which tear up trees by their roots, and cause the destruction of life by shipwreck, he recognises the law of storms, and is enabled to comprehend how the mariner, by steering his course in one direction, may avoid those dangers to which he would be exposed if he were to steer it in another. In this way it is plain that even a moderate acquaintance with the physical sciences cannot fail to add to the interest of life; an advantage which, under occasional circumstances, may be extended even to the humbler classes of society. A professor of one of our ancient universities, and a distinguished Fellow of the Linnean Society, does not consider it to be incompatible with his duties as a parish priest, nor beneath his dignity as a philosopher, to give such simple instructions in Botany to the girls of the village in which he resides as may enable them to understand the flora of the neighbouring district; thus affording them not only a useful, but a cheerful occupation for hours which would otherwise be passed in idleness.

It was on the 28th of November, just now 200 years ago, that several eminent individuals, who had previously been in the habit of meeting for the purpose of communicating with each other on subjects of common interest, assembled in Gresham College, and agreed to form themselves into a Society, having for its object the prosecuting of physico-mathematical experimental learning. When they reassembled on the following week, it was reported to them that what they proposed was highly approved by the reigning monarch, who intimated at the same time his desire to do what lay in his power towards promoting so useful an undertaking. Accordingly steps were taken for the incorporation of the Society under a Royal Charter, that Charter being conferred on them in due form two years afterwards. Such was the origin of the Institution which I have now the honour to address; and to which the world is indebted for the long series of scientific memoirs contained in the 150 volumes of the 'Philosophical Transactions.' The publication of these 'Transactions,' however, was not begun until the year 1665, and then only in the form of a few pages, produced at uncertain intervals, which, being collected, made a thin volume at the end of the year.

Many years elapsed before the 'Philosophical Transactions' became of larger dimensions. But we are not therefore to suppose, because so little was done in the way of publication, that little was really done for the promotion of the objects which the Founders of the Royal Society had in view. At this time Lord Bacon had already pointed out the right method to be pursued for the advancement of learning; and the abstract science of Geometry, inherited from an ancient nation, had been partially applied in the investigation of the physical sciences. Nevertheless it cannot be said that these sciences were more than in an infant state; and some which are now among the greatest subjects of attention, for instance Chemistry and Geology, had barely been called into existence. There was indeed as yet no sufficient number of facts collected on which the superstructure of science could be raised. The Founders of the Royal Society well comprehended what was required. If I may be allowed to use a homely expression, they had the good sense to begin at the beginning; and their first endeavours were to collect a larger number of facts by a course of experimental inquiry. Dr. Birch's 'History,' which occupies a period of twenty-seven years from the foundation of the Royal Society, furnishes us with a great deal of valuable information as to this part of their labours, and gives us a more just notion of what the Royal Society accomplished in those days, than can be obtained from the 'Philosophical Transactions' themselves. At the several Meetings experiments were suggested, which were afterwards carried into effect. Mr., afterwards Dr. Hooke, received a special appointment as experimentalist; for which office he was well qualified, not less by his practical skill, than by his great and discursive genius. The collection of the experiments proposed and made during the period which I have mentioned would of itself form an instructive volume. It might not indeed add much to our present knowledge, but it would show us in what manner much of that knowledge with which we are now familiar had its origin, and at the same time furnish a grand example of the caution and circumspection with which all experimental inquiries should be conducted.

With the gradual extension of knowledge, the method of inquiry necessarily became modified. The size of the volumes of the 'Philosophical Transactions' gradually increased, and longer and more elaborate memoirs superseded the brief notices of which the earlier volumes were composed.

It is not for us to give nor even to form an opinion of what the Royal Society has done during the last few years; but we are at liberty to refer to what has been done by our predecessors; and with regard to them we are justified in the conclusion that they have well performed the task which they had undertaken. In adding to human knowledge, they have added to human happiness. Standing apart from politics, they have pursued an independent course, having no selfish objects in view, but acting harmoniously with the Government of the day, whatever it might be. I am sure that every existing Fellow of the Society will join with me in the desire that we and those who come after us may continue in the same path, so as to maintain the dignity of science, and do honour to our country :—

> 'Alterum in lustrum meliusque semper
> Proroget ævum.'

ADDRESS

AT THE

ANNIVERSARY MEETING OF THE ROYAL SOCIETY,

NOVEMBER 30, 1861.

GENTLEMEN,—The peculiar circumstances under which the Council thought fit to propose me for re-election as President at the last Anniversary are, I apprehend, sufficiently known to make it unnecessary for me to trouble you with any observations on the subject. There was then reason to believe that in a short time I should be in that state which would enable me to resume all the duties of my office. Unfortunately those expectations were not realised; and you will, I am sure, easily conceive how deep was the disappointment to myself, that I should have been prevented, during the whole of the last session, from being present at our Meetings.* The President of your Society, however, has other duties besides that of presiding in this Chair, and to these I hope that I have not been altogether inattentive. Various subjects connected with the affairs of the Royal Society have from time to time demanded the attention of myself and the other officers; and the discussions to which these have led have, I have reason to believe, not been unproductive of a good result.

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* I received the following letter in relation to this subject:—

'MY DEAR HAWKINS,—You are aware that I wrote to General Sabine, Treasurer of the Royal Society, declining to have my name proposed for the Presidency during the next year, explaining at the same time, that even under the most favourable circumstances it would be impossible for me to perform the duties of the office for a considerable time to come. The Council met on Thursday, and came to a unanimous resolution that they wished me to allow myself to be nominated as President nevertheless, requesting General Sabine at the same time to communicate with me personally on the subject, and explain more strongly than could be done in writing, their desire that nothing should be done in the matter until the result of the operation on my right eye is known; and for this purpose General Sabine paid me a visit yesterday. He said that he had pretty well ascertained that what the Council proposed is in accordance with the wishes of the Society generally. Of course this leaves me no choice in the matter.

'Yours very truly,
'B. C. BRODIE.

'October 31, 1860.'

Referring to the events of the last year, I feel that I may with perfect confidence congratulate you on the position which we occupy. We have not, indeed, had to record any of those grand and startling discoveries by which some former epochs of our history have been distinguished. There never, however, was a period at which so many individuals, well qualified for the task, have been engaged in scientific investigations; and our published volumes bear ample testimony to the fact, that it is not in one only, but in every department of physical knowledge that a steady progress is being made. The Fellowship of our Society has never been a greater object of ambition than it is at present, nor do I believe that it has ever been held in higher estimation by the public. Our weekly Meetings, as I am informed, have been often productive of great interest, and sufficiently well attended: but on this last point I take this opportunity of making a few remarks, in order that I may correct what appears to me to be a great misunderstanding under which some have laboured on the subject.

Probably not more than one-third of our Fellows are permanently resident in London, and of these a large proportion are engaged in occupations which leave only a limited portion of time at their own disposal. The subjects which are brought under consideration, though frequently of paramount importance, are not of that general interest which would attract ordinary persons; nor, indeed, if we take any one of them, can it be regarded as equally attractive to every individual belonging to our own body. In the progress of knowledge, science has become divided and subdivided into many departments, and the principle of the division of labour has necessarily come into operation in these as well as in all other pursuits. A communication which would be highly attractive to a chemist, would not be equally so to a comparative anatomist or a physiologist; nor would the results of the inquiries on the subject of terrestrial magnetism, which have of late been carried on in almost every part of the world, important as they may eventually prove to be, be well comprehended except by the few who have bestowed their special attention on them. It seems to me, therefore, not reasonable to suppose that the Meetings of the Royal Society should be so numerously attended as more popular assemblies.

There is another matter as to which I conceive that some misapprehension has at times prevailed, namely, the relation in which our Society stands, or ought to stand, to the Government of the country. In many of the Continental States there is a society of individuals, under the name of an 'Academy,' engaged in the pursuit of science, limited in number, and each of them receiving an annual stipend from the public treasury. Such a system may be regarded as offering a premium to those who engage in scientific investigations; and the great results which have been obtained sufficiently demonstrate that where it has been established it has had a very beneficial operation. It would be, however, entirely inapplicable to an institution such as ours, consisting as it does of between 600 and 700 Members. Then the foreign Academies to which I have referred are entirely subjected to the Government, without whose approbation the election of a new member is incomplete. Now, it is plain that a system so inconsistent with the sentiments and habits of the inhabitants of these islands would find little favour here; and I apprehend that there is no individual among those whom I have now the honour of addressing, whatever his opinions on the abstract principle may be, who would not think it a most rash proceeding to apply it to the reconstruction of a Society such as ours, which has been steadily advancing in its career, and which is now, after the lapse of 200 years, more active and vigorous and useful than at any former period of its existence.

The best inducement to the cultivation of science is the love of knowledge, combined with that desire of honourable distinction—'*that last infirmity of noble minds*'—of which we must not complain, as it has led to such grand results; and experience shows that these are all-sufficient for the purpose. If any worldly advantage ever accrue to those who are thus engaged, that may be regarded as almost an accidental circumstance, which no one could have anticipated in the beginning.

Such being the state of things among us, I feel bound at the same time to say, that I cannot join with those who complain that the interest of science has been neglected by the Government. The Fellows of the Royal Society have never wished to forfeit their independence, by claiming, in their capacity as Fellows, any personal benefit for themselves. The connection of the Royal Society with the Government has been simply that of a mutual interchange of good offices. On the one hand, the Society has always been ready to assist those who are intrusted with the management of public affairs with its opinion and advice; and the occasions on which such assistance has been required have been sufficiently numerous. On the other hand, it has rarely, if ever, happened that any representation made by the Royal Society in the interests of science has not received the attention which it required. A sum voted annually by Parliament for the purpose of assisting those who are engaged in scientific investigations has been placed at the disposal of the Royal Society, to be distributed at the discretion of the Council. The extensive suite of rooms which we now occupy are the property of the State, and a similar accommodation has been afforded to four other of the chartered scientific societies; while another more popular institution has an annual grant from the public treasury, in order that it may be the better enabled to carry out the objects for which it was established.

There is nothing by which the pursuit of science in the present day is more signally distinguished than the greater accuracy and precision with which those investigations to which mathematical reasoning is either not at all or only to a limited extent applicable are conducted, as compared with what was the case when men's minds were first directed to these subjects; nor is there any prospect of our ever returning to those hypothetical systems which prevailed among scientific inquirers formerly. If there be at present any danger to the cause of science, it is of a totally different kind. The time has arrived when the discoveries of science are becoming extensively applied to commerce and manufactures, and the arts of common life. The greater part of society contemplate the achievements of science under this point of view, and estimate its value only as it affects the material interests of the country or of themselves. The prevailing study of political economy—and I say this without denying the great advantages which the community has derived from this comparatively new science—by directing men's minds so much to the increase of national wealth, as the object most deserving of our attention, has the effect of promoting the extension of this utilitarian principle more widely among us. The danger to which I allude is, that the cultivators of science might themselves be led to participate too largely in these utilitarian views. If it should be so, science must undoubtedly descend from the high station which it at present occupies. Nor can this happen without great injury to the cause of knowledge itself. The mere utilitarian philosopher, having his views limited to some immediate practical result, might, like the alchemists of old, elicit some new facts, but would discover no new principle, and after a long life would know no more of the laws of nature than he knew in the beginning. Eventually, even as to their gross material interests, society would be a loser. The sailor would never have had placed at his disposal the means of ascertaining the longitude, if philosophers, without reference to this object, had not studied mathematics and the laws of planetary motions; nor would London and Paris have ever been placed, as they now are, in instantaneous communication with each other, if those who began with the simple fact of the muscles of a frog's leg being made to contract by the contact of certain metals had not pursued these inquiries until they reached the laws of Voltaic electricity, never dreaming of the great invention which was ultimately to arise out of these researches in the shape of the electric telegraph.

The time has arrived for my resigning into your hands the office to which you were pleased to elect me three years ago. This has not only been the greatest honour which has ever been bestowed on me, but it has also been one of the most gratifying circumstances of my life, to have received such a testimony of the good opinion of individuals so distinguished for their genius and knowledge as the Fellows of the Royal Society of London. I have sincerely to thank not only the other Officers, but the Fellows generally, for numerous marks of attention and kindness, of which I am all the more sensible in consequence of the peculiar circumstances under which I have been placed.

The Copley Medal has been awarded to Professor Louis Agassiz, of Boston, in the United States, for the eminent services which he has rendered to various branches of physical science by the incessant labours of more than thirty years of scientific activity.

Commencing his career as a zoologist, Professor Agassiz early turned his attention to Ichthyology, and his 'Histoire Naturelle des Poissons d'eau douce' not only was in itself a very valuable work, but doubtless led the way to the still more important services which Professor Agassiz was destined to render to the same department of natural history—not the least of which was the great step in ichthyological classification made by the establishment of the order of Ganoids, a group which has now taken a permanent place in the Systema Naturæ.

The 'Monographie d'Échinodermes,' published between the years 1838 and 1842, and the 'Nomenclator Zoologicus,' which appeared in the latter year contemporaneously with other investigations of quite a different character, need only be mentioned to bear witness to the remarkable combination of originality, industry, and versatility which characterises their author. To these excellent qualities may be added tenacity of purpose; for, after a long interruption, Professor Agassiz, on his removal to the United States, resumed on a great scale those investigations of the lower forms of animal life which had occupied his younger days. The results of these inquiries, and those of his fellow-labourers Clark and Weinland, are embodied in the magnificently illustrated monographs entitled 'Contributions to the Natural History of the United States,' works which do equal credit to the naturalists who planned them, and to the State and people whose intelligent munificence renders their publication possible.

Cuvier's great work, the 'Ossemens Fossiles,' embraces, as is well known, an account of the fossil remains of all the higher classes of vertebrated animals; but the founder of palæontology left the difficulties of fossil ichthyology to be grappled with by others, and discerning the especial aptitude of Agassiz for the undertaking, indicated him as his continuator in this department. Nor can it be denied that the author of the 'Recherches sur les Poissons Fossiles,' and the 'Monographie des Poissons Fossiles du vieux grès rouge,' has amply justified the sagacious anticipation of Cuvier. Travelling over the Continent and these islands from one collection to another—never possessing specimens of his own, but obliged to trust to notes and to the sketches of the excellent artist who accompanied him—dealing with remains which were almost always fragmentary and presented far less definite characters to the anatomist than the bones of higher animals—Professor Agassiz, nevertheless, succeeded, in the course of eleven years, in producing works which form a worthy continuation of the 'Ossemens Fossiles;' and this not merely on account of the excellent descriptions and figures of fossil fish, in vast number, which first appeared in their pages, but because associated with the history of extinct forms are all the complementary investigations into the osteology, dentition, and scale-structure of their recent allies required for their elucidation.

The award of the Copley Medal for these investigations alone would be regarded but as an act of justice by the students of Palæontology, but it must not be forgotten that Professor Agassiz has made many other contributions of no slight value to this branch of science.

It might be supposed that labours of such magnitude and difficulty as those which have just been mentioned, would suffice to give full occupation to one mind, whatever its activity; but while Professor Agassiz was thus becoming familiar to zoologists and palæontologists as one of the most active members of their confraternity, geologists and physical geographers knew him as a vigorous worker and bold theorist in their departments. In fact, what is now known as the 'Glacial Theory,' although not altogether originated by Professor Agassiz, was greatly extended by him, and assuredly owes the position it has acquired in science in very great measure to his efforts—his work, 'Theorie der erratischen Blöcke der Alpen' (1838), his other writings, and his genial eloquence at scientific meetings, having done more than anything else to attract the attention of geologists to the efficiency of ice as a modifier of the earth's surface, and as a means of transport. Thus led to the consideration of glacial phenomena in general, Professor Agassiz, accompanied by M. Desor and others, next devoted many months of several successive years to the systematic study of the glaciers of his native country—especially to that of the Aar, where, under the mighty boulder nicknamed by those whom it sheltered the 'Hôtel des Neufchatelois,' inquirers of all nations found not only a welcome, but the nobler hospitality of a free access to all that was being thought and planned and done by the little party of savans of whom Agassiz was the head. The results of the investigations thus laboriously carried on, were embodied in the 'Études sur les Glaciers,' published in 1840, and the 'Nouvelles Études,' which appeared in 1847; and apart from all minor contributions, Professor Agassiz will be admitted by all who duly acquaint themselves with the history and present state of the question, to have made two important additions to our knowledge of glaciers. For, in the first place, the general account of the glaciers of the Aar given by Professor Agassiz in the 'Nouvelles Études,' and the trigonometrical survey of the same glacier executed by M. Wild under his auspices, were works of unrivalled excellence when published, and have never been surpassed. And in the second place, without detracting in any way from the merit due to others, it may with certainty be affirmed that Professor Agassiz was the first to take the proper means to ascertain the relative motion of the central and lateral parts of a glacier, which was done in the autumn of 1841; and that he also had the good fortune to reap the fruit of his arrangements, by being the first to make public (in the 'Comptes Rendus' for August 29, 1842) the novel and to him unexpected result that the centre of a glacier moves faster than the sides.

PROFESSOR MILLER, It is the happy combination of intellectual genius with diligence and perseverance that has enabled M. Agassiz to arrive at the great results, a brief statement of which has just been read by the Secretary. In your hands, as Foreign Secretary, I place the Copley Medal which the Council have awarded to M. Agassiz, requesting you that, when you have the opportunity of transmitting it to him, you will at the same time express that as it is the greatest honour the Royal Society has to bestow, so it sufficiently shows the high estimation in which they hold his scientific labours.

A Royal Medal has been adjudicated to Dr. William B. Carpenter, F.R.S., for his Researches on the Foraminifera, contained in four memoirs in the 'Philosophical Transactions,' his Investigations into the Structure of Shell, his Observations on the Embryonic Development of Purpura, and his various other writings on Physiology and Comparative Anatomy.

Dr. Carpenter has long held a high place as a systematic writer on Human and Comparative Physiology, and his well-known works have served, more perhaps than any others of their time, to spread the knowledge of those sciences and promote their study among a large class of readers. These writings, moreover, while they admirably fulfil their purpose as systematic expositions of the current state of knowledge on the subjects which they comprehend, afford evidence throughout of much depth and extent of original thought on most of the great questions of Physiology.

While not unmindful, however, of these merits on the part of Dr. Carpenter, or of his earlier special contributions to science, the Council have awarded him the Medal, in accordance with the existing terms of its adjudication, on account of his researches on various branches of Comparative Anatomy and Physiology published in later years.

Among those researches which more especially demand notice on this occasion, the first in point of time is the series of elaborate investigations on the intimate structure of Shell. By these inquiries Dr. Carpenter discovered that a very definite structural arrangement exists in the shells of many mollusca, and presents modifications which serve, in many instances, to characterise natural groups, as being in harmony with the general affinities of the animal. The group of Brachiopoda, in particular, he showed to be thus distinguishable from other bivalves; and he further found that, among the Brachiopoda themselves, certain groups of species are differentiated from the rest by having their shells perforated with large canals, occupied in the living animal by cæcal prolongations of the mantle. The presence of these perforations, which had previously been considered to be mere surface markings, Dr. Carpenter showed to be a constant character of the Terebratulidæ, and their absence an equally constant character of the Rhynchonellidæ; whilst in other families, certain genera or sub-genera are distinguished by their presence from those in which they are absent. The validity of this distinctive character has since been amply confirmed by Mr. Davidson in his elaborate investigations of British Fossil Brachiopoda.

Dr. Carpenter's first contribution to the minute study of the Foraminifera was a memoir read before the Geological Society in 1850, in which he showed the necessity of a careful microscopic inquiry into the structure of the organisms of the class in question, for the elucidation of their real nature and affinities; and, taken in connection with Professor W. C. Williamson's previous memoirs on *Polystomella crispa,* this memoir may be considered as having laid the foundation for the truly scientific study of the Foraminifera, which has since been vigorously prosecuted by Professor Williamson, MM. D'Archiac and Haime, and Messrs. W. H. Parker and Rupert Jones, as well as by Dr. Carpenter himself.

In the four memoirs on the minute structure of the most highly developed forms of this class which Dr. Carpenter has contributed to the 'Philosophical Transactions,' he has described some most remarkable types which were previously quite unknown; he has given a detailed account of the very complex organisation existing alike in the foregoing and in types previously well known by external configuration; he has demonstrated the entire fallacy of the artificial system of classification hitherto in vogue, the primary divisions of which are based on the plan of growth; he has laid the foundation of a natural system, based on those characters in the internal structure and conformation of the shell which are most closely related to the physiological conditions of the animal; and, finally, by the comparison of very large numbers of individuals, he has proved the existence of an extremely wide range of variation among the leading types of Foraminifera; often reassembling under a single species, varying forms which, for want of a sufficiently careful study, have been not merely separated into distinct species, but had been arranged under different genera, families, and even orders. In this last conclusion, which has an important bearing upon the question of the real value and meaning of natural history species generally, Dr. Carpenter has been fully borne out by the parallel inquiries of Messrs. Parker and Rupert Jones, which, relating to an extensive series of less developed types not especially studied by him, form, as it were, the complement of his own.

In his researches on the embryonic development of *Purpura Lapillus,* Dr. Carpenter's attention was specially directed to the elucidation of the fact that, from the many hundreds of egg-like bodies contained in each nidamental capsule, only about thirty embryos are evolved, each of them many times larger than the ovum from which it originated. It had been affirmed by some previous observers that the entire assemblage of ova coalesces into a single mass, which subsequently breaks up into a smaller number of portions, each of which developes itself into an embryo. Dr. Carpenter, on the other hand, was led to the conclusion, that of the total number of egg-like bodies, a few develope themselves into embryos after the usual plan of aquatic gasteropods, while the remainder coalesce into a single mass. To this mass the embryos attach themselves by their mouths, and gradually ingest the particles of which it is composed until it is all shared among them; they thus become distended to many times their original bulk, and on the additional store of nutriment thus obtained, their development is carried on to an advanced stage within the capsule. Dr. Carpenter's account of the process was warmly attacked by certain observers who had given a different explanation of it, but it was fully confirmed by subsequent trustworthy inquirers; and there seems a strong probability that it is true of the Pectinibranchiate Gasteropods generally, since in many of them the like replacement of numerous small egg-like bodies by a few large embryos has been observed.

Dr. Carpenter, You have been long engaged in the cultivation of a science which, important as it is in various other ways, has this peculiar interest, that it leads us to a more exact knowledge than we could otherwise obtain of that part of the creation to which we ourselves belong; not only explaining the structure and functions of the various organs of which the human body is composed, but even assisting us to obtain more accurate notions of those higher qualities, those intellectual and moral qualities, by which man is eminently distinguished from all other animals. In the name of the Royal Society I present to you this Medal as a token of their high appreciation of your labours.

A Royal Medal has been awarded to Mr. James Joseph Sylvester, F.R.S., for his Memoirs and Researches in Mathematical Science.

Professor Sylvester's mathematical writings extend over a period commencing in the year 1837; separately, and as a whole, they display in an eminent degree the originality and inventive and generalising power of their author, and they have very greatly contributed to the advance of pure mathematics, more particularly as regards the Finite Analysis or Algebra, in the widest sense of the word. Several of the earlier papers relate to subjects which are resumed and developed in those of the last ten years; and on this ground it is right to allude to the researches on the theory of determinants, and the dialytic method of elimination; and also to the remarkable discovery as to Sturm's Theorem. It is well known that the theorem in its original form gave only *a process* for finding the functions which determine the number and limits of the real roots of an equation; the determination of the actual expressions of these functions in terms of the roots was an extension and completion of the theory, the merit of which belongs exclusively to Professor Sylvester. The subject is considered in detail, and various new and valuable results in connection therewith are obtained, in the elaborate memoir in the 'Philosophical Transactions' for 1853. 'On a theory of the Syzygetic relations of two rational and integral functions, comprising an application to the theory of Sturm's functions and that of the greatest algebraical common measure.' The same memoir contains also a very original theory of the intercalations or relative interpositions of the real roots of two independent algebraical equations, and a new method of finding superior and inferior limits to the roots of an equation, characterised by the employment of formulæ involving arbitrary coefficients which may be determined so as to bring the limits into coincidence with the extreme roots. The memoir contains also, in connection with the subjects to which it primarily relates, valuable researches on the theory of Invariants.

In regard to this theory, several capital discoveries belong to Professor Sylvester—the law of Reciprocity considered as a law relating to the *number* of Invariants—Contravariants, which, although now seen to be included in the notion of an invariant, were a conception to which is due much of the progress of the theory—the theory of the Canonical forms of binary functions of an odd order, and (less completely developed) the more difficult theory for those of an even order—and Combinants, a theory, the resources of which are still to be developed, but a first-fruits of which was the determination, in a manageable form, of the resultant of three ternary quadratic functions.

Only a sketch of a singularly elegant geometrical theory of the derivative points of a cubic curve has as yet been published, in a paper in the 'Philosophical Magazine' (1858).

The very original investigations forming the subject of the Lectures on Partitions are also as yet published in an incomplete form.

There are many other papers which might with propriety be specially noticed, but it is obviously impossible on the present occasion to give anything like a complete account of the labours of Professor Sylvester; among the latest of them are the researches on the Involution of six lines. The nature of the relation can be easily explained. Six lines may be such that, considered as belonging to a rigid body, there exist forces acting along these lines which keep the body in equilibrium; or, what is the same relation between them, they may be such that the equilibrium of a system of forces about these lines as axes, does *not* imply the complete equilibrium of the system of forces. But the consideration of such a system of lines leads to a long series of geometrical theorems relating to curves in space, and ruled surfaces of the third and fourth orders, and opens a wide field for future researches.

PROFESSOR SYLVESTER, Passing over the metaphysical question as to the origin of those simple conceptions from which as a starting-point all mathematical inquiries must set out, it is plain that whatever is done afterwards is the result of the exercise of the pure intellect; and there is perhaps nothing more remarkable in the history of human nature, or which tends to give us so exalted a notion of the powers of the human mind, as that out of such simple materials so marvellous a fabric should have been created as that of modern mathematics. Your eminence as a mathematician is so universally acknowledged, that it can need no eulogium from myself, and I have therefore only to add, that the Medal which I now place in your hands, is awarded to you by the Royal Society as a just acknowledgement of the value of your labours.

QUACKS AND QUACKERY.

FROM THE QUARTERLY REVIEW,

DECEMBER 1842.

In Lady Mary Wortley Montagu's letters from Italy she thus describes the physician who attended her in a dangerous illness:—

'He will not allow his patients to have either surgeon or apothecary. He performs surgical operations with great dexterity, and whatever compounds he gives he makes in his own house, which are very few, the juice of herbs and these waters being commonly his sole prescriptions. He has very little learning, and professes to draw all his knowledge from experience, which he possesses perhaps in a greater degree than any other mortal, being the seventh doctor of his family in a direct line. His forefathers have all left journals and registers solely for the use of their posterity, none of them having ever published anything; and he has recourse on every difficult case to these manuscripts, of which the veracity at least is unquestionable.'

Here is an example of an individual who lived less than a century ago, but who belonged to the primitive order of medical practitioners, such as flourished in the early ages of society, before the healing art was taught in schools, or had begun to assume the character of a science. The family of the Asclepiades were practitioners of the same description, Hippocrates himself being described as one of them, and the seventeenth in a lineal succession from its founder Æsculapius.

And we have no doubt that Lady Mary's Italian physician, as well as his predecessors of ancient times, had accumulated a considerable store of important practical knowledge, derived from the only true source of all knowledge—observation and experience; and beyond all comparison more useful to the world than the speculative doctrines which were promulgated by some distinguished professors on the first establishment of medical schools. It was about the time of Lady Mary's illness that the celebrated John Brown began to direct his attention to the study of medicine. The Brunonian theory, and the name of its founder, have been celebrated over the whole of Europe, while the reputation of the humble Italian never extended beyond the limits of the narrow district in which he practised, and has probably even there long since perished; but we suspect that the patients of the former must have had a poor chance of recovery compared with those who shared the attentions of the latter.

We are not, however, so heterodox as to maintain that the method pursued by the Asclepiades, or by the practitioner of Lovere, is the best that can be devised for the attainment of a knowledge of medicine and surgery. We have no right to place John Brown, nor even Boerhaave or Cullen, in the same category with the best professors of modern times. Combinations of individuals, and the division of labour, are as useful in these as in other sciences, and have done for them what could never have been done by the most earnest individual exertions. A better knowledge of anatomy, physiology, and chemistry, has laid the foundation of more just notions of disease; the studies pursued in the wards of our hospitals have assumed altogether a practical form; and in the application of remedies the question is no longer how far they dovetail in with a prevailing theory, but what has been actually observed to be the result where they have been administered in other cases.

Still, whatever may be the amount of actual knowledge which has been handed down to us from age to age, and however improved the method of studying may be, it is evident that the medical sciences have not yet attained, and to us it does not appear probable that they ever will attain, the same degree of perfection with some other branches of knowledge. In the living body not only is there in operation the combined influence of the mechanical and chemical laws of matter, but to these is superadded another set of laws, and another order of phenomena, namely, those of *vitality*. Hence it is that there are few other sciences equally complicated with these; or in which it is so difficult to obtain an exact knowledge of facts, or to make extensive and well-founded generalisations. It is also evident that the art of applying these sciences to practice can never meet the demand which is made upon it, or satisfy the expectations, we will not say of society as a body, but of the individuals who compose it. It may do much, but it cannot do all that is wanted; for if it could, pain would be banished from the world, and man would be immortal. No one will hesitate to admit this as a general proposition; but that is quite a different matter from the application of it in a particular instance to our own peculiar case. The instinct of self-preservation is powerful within us, and it is from this natural and obvious cause, as well as from others to which we shall advert hereafter, that mankind have been led in all ages to look for other means of obtaining relief in illness besides what are afforded to them by those who have been regularly instructed as medical practitioners.

We are not to suppose that all of those whose names might be comprised in a list of medical impostors have been really dishonest. Many of them have evidently been mere enthusiasts, stimulated probably by the double motive of doing service to their fellow-creatures and gratifying their own vanity. Others have been in the no uncommon situation of inventing lies first, and believing their own inventions afterwards. We have been informed on good authority of the vendor of a quack medicine who had such disinterested faith in his own remedy, that in his last illness he would have recourse to no other—and died taking it. But we fear, nevertheless, that the honest party among these pretenders is in a small minority, and that with the greater number the only object which they have had in view has been that of turning the weakness of mankind to their own advantage, laughing in secret at the individuals whom they have duped.

A well-digested history of this irregular order of medical practitioners would not be uninstructive. It would present to us a curious list of priests and nobles, philosophers, simpletons, and knaves. Even royalty itself would not be absent from it. The name of king's-evil was applied to scrofulous diseases because the kings of England and France claimed, and were supposed to possess, the power of curing it by the simple process of touching the afflicted with the hand. The hand of the seventh son of a seventh son, and also the hand of a man who had been hanged, possessed the same healing property—which last must have been a flattering association for the monarchs. In England it is said that the miracle was first wrought by Edward the Confessor; nor did the lapse of centuries impair the faith of any of the parties concerned—Charles II. having, in the course of twenty-two years, during which exact registers were kept, touched 92,107 scrofulous persons. Wiseman, who held the office of serjeant-surgeon, a man of great repute in his day, and of undoubted skill (for the folio volume on surgery which he has left behind him may be consulted with advantage even at the present time), bears the following testimony to the efficacy of his royal master's treatment: —'I must needs profess that what I write' (that is, on the subject of scrofula) 'will do little more than show the weakness of our ability when compared with his Majesty's, who cureth more in one year than all the surgeons in London have done in an age.' Brown, who was also one of his Majesty's *chirurgeons*, and *chirurgeon* of his Majesty's hospital in London, makes a statement similar to that of Wiseman, and asserts that Cromwell was anxious to exercise this as well as the other prerogatives of royalty, but that the practice failed in his hands, 'he having no more right to the healing power than he had to the legal jurisdiction.' It seems, however, that the faith of Wiseman was not so absolute but that he deemed it expedient to add to his other dissertations sixty-four closely-printed pages on the history of the king's-evil, and the mode of treating it by ordinary means. It is probable that there were others who had no faith at all, although it might be dangerous to express their sentiments—one Thomas Rosewell having, in the year 1684, been tried on a charge of high treason, for having publicly said that 'the people made a flocking to the king upon pretence of being healed of the king's-evil, which he could not do, but that they, being priests and prophets, could do as much. Rosewell was found guilty, but afterwards pardoned. King William declined to exercise this part of the royal prerogative, but it was resumed by Queen Anne, as is shown by a passage in the 'Life of Dr. Johnson,' in which it is stated that he was taken to her Majesty when a child 'to be touched for the evil, by the advice of an eminent physician, Sir John Floyer.' The good sense of King George I. put an end to this absurdity, but it continued to flourish in France under Louis XV., and in this country it was soon followed by others, over which the royal authority had no control.

'I find,' says Lady Mary Wortley Montagu, in a letter dated Lovere, July, 1748, 'that tar-water has succeeded to Ward's drops; and it is possible that some other form of quackery has by this time taken place of that. The English are, more than any other nation, infatuated by the prospect of universal medicine,' &c. &c.

The history of the medicine which is here referred to is singular enough; proposed as it was, not by a charlatan seeking to impose on the public for his own profit, but by a benevolent clergyman, a metaphysician and mathematician: a philosopher distinguished alike for the clearness of his perceptions and the acuteness of his reasonings. Bishop Berkeley, having proved to his own satisfaction that the existence of a material world is a mere delusion, did not hesitate to believe that the drinking of tar-water 'would mitigate and even prevent the small-pox and erysipelas; that nothing is so useful as this in cases of painful ulcers of the bowels; in consumptive coughs, and ulcers of the lungs, with expectoration of pus; that it cures asthma, dropsy, and indigestion, the king's-evil, all kinds of sores, and the foulest disorders.' Time and experience only confirmed him in these opinions. In a subsequent publication he says:—'I freely own that I suspect tar-water to be a panacea. . . . And as the old philosopher cried aloud from the house-top to his fellow-citizens, "Educate your children," so, if I had a situation high enough, and a voice loud enough, I would say to all the valetudinarians upon earth, "Drink tar-water."'

But it happened, as had been anticipated in the letter which we have just quoted, that the reputation of tar-water was not of much duration; and it has been long since not only neglected, but forgotten.

Another specific which was in vogue about the same time shared no better fate, although it was first recommended on the authority of another distinguished philosopher, who was also a physician, and afterwards sanctioned by the three branches of the legislature. A certain Mrs. Stephens professed to have discovered a cure for the gravel and stone in the bladder and kidneys, in the shape of a powder, and a decoction of pills, all to be administered internally. The celebrated David Hartley collected evidence on the subject, and published an octavo volume recommending Mrs. Stephens' medicine, with an account of 150 cases in which it was supposed to have been administered with advantage, his own case being among the number. Mrs. Stephens offered to make known her secret to the public for the sum of 5000*l*. An attempt was made to raise the amount by subscription, and several noblemen and gentlemen promised their contributions towards it; in the list of whom we find the names of some eminent physicians and surgeons —Dr. Peter Shaw, Dr. Monsey, and Mr. (afterwards Sir) Cæsar Hawkins. Not more than 1387*l*., however, having been collected, application was made to parliament, by whom the sum required was granted, the composition of the specific being afterwards published in the 'London Gazette.' It consisted of egg-shells and snail-shells, with the snails in them, all calcined; ash-keys, hips and haws, swinecress and various other vegetables, all burned to a cinder; with camomile flowers, fennel, and some other vegetables —these last not being burned in the same manner. The disclosure of the mystery did not add to the reputation of the medicine. It gradually fell into disuse. Dr. Hartley himself died of the disease of which he had supposed himself to be cured; and we will venture to say that among the other patients who were really afflicted in the same manner, and who did not resort to other methods of relief, there were none who did not share Dr. Hartley's fate. It would, indeed, be a matter of astonishment that so many grave persons should have arrived at a conclusion on such insufficient evidence as that which Dr. Hartley had furnished, if we did not know how easy it is for mankind to be made to believe that to be true which they wish to be so.

These histories are sufficiently instructive to those who are disposed to learn; but the next is more instructive still. It is within the memory of many now alive, that an individual of the name of Perkins claimed the discovery of a new method of curing diseases by the application to the surface of the body of certain pieces of metal, prepared by himself in some unknown manner, and sold by him under the name of 'metallic tractors.' This agency was attributed to some kind of magnetic influence which the tractors possessed, and, if the report of the inventor could be believed, the effects which they had produced in his own country (the United States of America) were indeed marvellous. The trials made of them in England were at first not less successful than those on the other side of the Atlantic. Persons of the highest station, as well as in other grades of society, bore testimony to the wonders which they worked. 'Among the vouchers,' says Mr. Perkins, 'will be found eight professors in four universities, in the various branches, as follows: three of natural philosophy, four of medicine, one of natural history: to these may be added nineteen physicians, seventeen surgeons, and twenty clergymen, of whom ten are doctors of divinity; and many others of equal respectability, Perkinism advanced rapidly in reputation everywhere; but the chief seat of its triumphs seems to have been in Bath, which at that period, before the road was opened to the German Spas, was resorted to by a vast number of invalids of every description, and what was more to the purpose, by a host of *malades imaginaires* also. Nor was this all. It was thought, and not without reason, that, if the principle were good, it might be extended further; and many grave and sober-minded gentlemen wore pieces of loadstone suspended round the neck, for the purpose of preventing or curing the gout.

But unfortunately for Perkinism, there dwelt in Bath a certain shrewd physician, Dr. Haygarth, who was not inclined to yield implicitly to the authority of the aforesaid university professors, nor of the ten doctors of divinity, and ten other clergymen, nor even of the thirty-six wiseacres of his own craft, who had borne witness to the efficacy of the tractors. It occurred to him that he had neither seen nor heard of any effects following the use of the tractors which might not fairly be attributed to the influence of the imagination either of the patient or of the bystanders. In order to determine how far this was or was not the case, he provided some pieces of wood fashioned to the same shape, and painted of the same colour, as the tractors; and then by an innocent—we will not call it a pious—fraud he caused them to be applied, under the pretence of their being the genuine tractors, in the usual manner to various patients. The experiments were conducted partly by himself, and partly by a gentleman who still lives enjoying the respect of the profession to which he belongs—Mr. Richard Smith, surgeon to the Bristol infirmary; and they were witnessed by a great number of persons. The results were not less remarkable than those which followed the use of the real Perkinean instruments. There was only one patient among those subjected to the operation who did not declare that he experienced from it more or less benefit, and in *him* the effect of it was greatly to augment his sufferings, so that he would on no account allow it to be repeated. He said that 'the tractors had tormented him out of one night's rest, and that they should do so no more.' This exposure was a death-blow to Perkinism. Even in Bath, the following year produced only a single case of supposed cure from the tractors; and in the course of two or three years the delusion had vanished in other places.

It was not very long after the period which is here referred to that some one recommended *mustard-seed*, to be taken internally, as a cure for all sorts of disorders. One or two wonderful recoveries, which were said to have followed the taking of mustard-seed, gave it at once a vast reputation. Everybody took mustard-seed. The street in which it was sold was crowded with carriages, the tenants of which were patiently waiting until it came to their turn to be drawn up to the emporium of mustard-seed. This lasted for two or three years. It was then discovered that mustard-seed did no more than a great number of remedies could do, which it was less disagreeable to swallow; and that some persons suffered harm from the quantity of it which they had taken; and the delusion went the way of the tractors.

A young man, who had been brought up as a journeyman-cooper, was instructed by his mother in the art of *shampooing*. Shampooing, and other modes of friction, have been long known as useful remedies in certain cases of stiff joints and weakened limbs, and as a substitute for exercise in bedridden patients; and there are many respectable females, of the class of nurses, in London, who practise the art very successfully, and think themselves amply remunerated for their labour by earning a few shillings daily. But this youth was more fortunate. One or two cures, which it was reported that he had made, caused him to be talked of at every dinner-table. It was believed that he had made a prodigious discovery in the healing art—that shampooing, performed according to his method, was a remedy for all disorders. Not only those to whose cases the treatment was really applicable, but those to whose cases it was not applicable at all—patients with diseases of the hip and spine, of the lungs and liver—patients with the worst diseases, and patients with no disease whatever—went to be shampooed. The time of the artist, being fully occupied, rose in value; and we have no doubt that we do not over-estimate his gains in saying that, for one or two years, his receipts were at the rate of 6000*l*. annually. A young lady, whose lower limbs had been paralytic from infancy, was brought to him from the country to be cured. At the end of a year, 500*l.* having been expended in the experiment, she returned home in the same state as when she had left it: but promises were made to her that if the process were repeated it would produce the desired effect at last, and she came to London again for the purpose. The result was such as might have been anticipated. Matters went on thus for three or four years, when the delusion ceased about as suddenly as it had leapt into vigour, and the shampooer found himself all at once deprived of his vocation.

The history of St. John Long is in the recollection of many of our readers. The individual had been brought up as a painter, but finding this profession to be productive of no immediate profit, he turned his attention to the healing art. His principal remedy was a liniment, of which we believe that oil of turpentine and some kind of mineral acid were the principal ingredients. However that may have been, in common with many other stimulating applications, it had the property of producing an exudation from the surface of the skin. The physician's theory was, that all diseases depend on a morbific matter in the blood, and that the exudation from the skin was this poison drawn out by the power of the liniment. Thus extraordinary cures were made of gout and rheumatism, abscesses of the lungs and liver, and *insanity.* A noble lord saw a fluid resembling quicksilver extracted from a patient's head. The house in which these miracles were wrought was crowded with patients belonging to the affluent classes of society, and the street with carriages. At last some cases occurred in which the application of the liniment caused a violent inflammation, ending in extensive gangrene. One patient died, and then another, and we have reason to believe that one or two others met with the same fate. The practitioner was convicted of manslaughter. If the remedy were of any real value, we do not know that these cases proved anything but the necessity of greater caution in the use of it; for there are few agents for good which, if carried too far or had recourse to on improper occasions, may not be agents for evil also. The public, however, did not look so far as this, and their faith in the treatment was rapidly abating when the practitioner himself fell a victim to pulmonary disease.

There is a curious sequel to this history which has been communicated to us on good authority. But we have no wish to make individuals, who had no very wrong intentions, look ridiculous, when it can answer no useful purpose to do so. Suffice it then to say that a medical practitioner, who had a fair reputation in the district in which he resided in the sister-kingdom, was persuaded to occupy the house in which the liniment had worked such wonders, with a view to carry on the same method of treatment, and with the self-same remedies. The charm, however, was no more in his hands than that of 'touching for the evil' had been in the hands of Cromwell: the street was empty of carriages, and the drawing-room of patients, and the new-comer was soon glad to return to his former, and, we hope, more useful and profitable occupation.

These projects, with a great number of others of the same description, are now matters of history. They have lived their day, and have been long since dead and buried. But we are not to suppose that the race of them is extinct, or that this age of wealth, luxury, and leisure is less favourable to their development than those which have preceded it.

Mr. Vallance, the author of one of the works of which the titles are placed at the beginning of this article, is not the inventor, but he fills the no less useful though more humble office of promulgator, of the *brandy-and-salt* remedy. This vast discovery was made by a Mr. Lee, an English gentleman, who, as Mr. Vallance informs us, possesses an estate of 12,000 acres of land in France (it is not said in what part), on which he resides in a castle with two gamekeepers, one chaplain, and eighty domestics. An accidental circumstance led him to a knowledge of the medicinal virtues of a solution of six ounces of common culinary salt in one pint of French brandy. Sometimes used externally, and at other times taken internally, it removes the effects of the stings of mosquitoes, gnats, wasps, bees, and vipers; it cures the head-ache, and earache, and side-ache; gout, consumption, scrofula, insanity, chilblains, mortification, and about thirty other disorders:—

'Mr. C. C., of Bishop's Lane, was cured of the gravel in a few days.'

'Richard Cowley, my boy, had his feet crushed by the fall of a window-shutter, so that the blood gushed out at his toe-ends, but, thanks to the influence of brandy and salt, he was cured in a week.'

'John Calvert, James Crowest, and Mr. L. were all dying of consumption, but recovered rapidly under the use of brandy and salt.'

Even the worst complications of disease yield to this remedy. A lady who was afflicted at the same time with a sore leg, a bad breast, an abscess in her back, another abscess under her arm, and with rheumatism, was cured of these five disorders in the course of six weeks.

But the most interesting case is that of Captain Plumb, of the 'Ann,' London trader, who was extremely ill 'all over his body, inside and out, and thought himself near death.' The captain was restored to health in the course of one month.

And, as far as Mr. Lee is concerned, all these benefits have been conferred on society from no other motive than that of pure benevolence. He is not only not paid, but he actually pays for the cures which he makes, having given away in the course of one year not less than a hogshead of brandy and salt to his patients. Neither can Mr. Vallance be accused of being influenced by the desire of lucre to any immoderate extent, if we may venture to form an opinion on the subject from the following notice at the end of his treatise:—'As I receive a great many letters requesting advice in particular cases, I beg to state that I cannot undertake to answer any, except a remittance of one shilling be made, with a penny post-ticket to pay the postage.'

The pretensions of *Homœopathy* are of a more lofty character than those of brandy and salt. The homœopathist claims the discovery of a law of nature before unknown; the establishment of a new science; the invention of a new method of curing diseases so efficient and certain, that hereafter none ought to be held to be incurable; and he denounces the absurdity and mischief of the healing art, as it is commonly practised, in language not less vehement than that of Paracelsus, when he publicly burned the works of Galen and Avicenna as being those of quacks and impostors, exclaiming to the crowd who were assembled to witness the ceremony—'You will all follow my new system, you professors of Paris, Montpellier, Cologne, and Vienna; you that dwell on the Rhine and the Danube; you that inhabit the isles of the sea; and ye also, Italians, Dalmatians, Athenians, Arabians, and Jews, ye will all follow my doctrines; for I am the monarch of medicine!'

Dr. Hahnemann, the founder of the homœopathic system, having been educated as a physician, was engaged in medical practice, first in a small town of Saxony, and afterwards in Dresden.* This pursuit, however, was by no means suitable to his genius. We are informed that, having acquired more reputation than profit, he was compelled to eke out his professional gains by the translation of foreign works. But his ill-success was not to continue for ever.

'All at once,' we quote the words of Mr. Erneste George de Brennow, the translator of the 'Organon,' 'a new idea illuminates his mind; a new career is opened to him, in which nature and experience are to be his guides. Obstacles and difficulties without number retard his solitary progress in the hitherto untrodden track; but his never-failing courage surmounts them all. The most astounding phenomena are presented to his contemplation; he mounts from one certainty to another, penetrates the night of mists, and is at last rewarded for his toil by the sight of the star of truth shining brilliantly over his head, and sending forth its rays for the benefit of suffering human nature.'

It was not, however, until after the lapse of some years that Hahnemann deemed it expedient to communicate his discovery to the world. Having done so, in the expectation of better fortune than he had met with at Dresden, he changed his residence to Leipsic.

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* Curie's 'Principles of Homœopathy,' pp. 15, 16.

Under his new method of practice Hahnemann became the dispenser of his own medicines, thus combining the offices of physician and apothecary. This, and probably some other circumstances, roused the jealousy of the regular practitioners. An absurd, and we may say a most unjustifiable, persecution followed, which ended in a decree against him in the Saxon Courts of Law. But what was intended for his ruin laid the foundation of his fortune. It made him and his doctrine known, and excited the sympathy of the Duke of Anhalt Cöthen,* who first offered him an asylum at his court, and then made him one of his councillors. From thence he removed some years afterwards to Paris.

Now the hitherto unknown law of nature, the grand secret which the 'star of truth' revealed to Hahnemann after he had 'penetrated the night of mists,' is so simple that it has been stated by him in three words—'*Similia similibus curantur.*' Plain, however, as this announcement may be, we suspect that some among our readers may not at once perceive in what manner the aforesaid law of nature is applicable to the healing art, and to such obtuser intellects the following explanation may be satisfactory. A disease is to be cured by exhibiting a medicine which has the power of producing in the patient a disease of the same nature with that from which he desires to be relieved. Two similar diseases cannot coexist in the same system, nor in the same organ. The artificial drives out the original disease, and, having done its business, evaporates and leaves the patient restored to health.

It must be owned that there is in this doctrine something which is rather startling to the uninitiated. We had never before even dreamed that we could produce a given disease at our pleasure. Besides, if the doctrine were true, bark ought to produce the ague, and sulphur the itch; mineral acids should be the cause of profuse perspirations; and jalap (as it is given to relieve certain viscera) should occasion their oppression. Nor are these difficulties got rid of by the (so-called) facts which Hahnemann offers in illustration of his principle; such as that* belladonna produces the exact symptoms of hydrophobia; that *Thomas de Mayence*, *Münch*, *Buchholz*, and *Neimicke* cured that terrible disorder by the administration of this poison; and that *Rademacher* † cured a fever with delirium and stertorous breathing in a single night by giving the patient wine. Indeed, it seems to us remarkable that Hahnemann should not have provided himself with some better examples in favour of the doctrine which he would inculcate than those which he has presented to us, believing, as we do, that there is no opinion as to the nature and treatment of diseases, however absurd, for which some kind of authority may not be found by any-one who will condescend for that purpose to grope among the rubbish of medical literature.

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* Curie, p. 20.

However, it is not so much our wish to criticise the works of the homœopathic writers, as to furnish such an analysis and exposition of their doctrines as may render them in some degree intelligible to our readers, very few of whom have, we suspect, been at the pains of looking into these matters for themselves.

Having thus satisfied himself of the truth of the maxim 'revealed to him by the star of truth,' *similia similibus curantur*—and that it applies not only to physical, but also to moral ailments—(in proof of which last assertion Dr. Curie—p. 79—quotes the authority of Eloisa:—

> O let me join
> Griefs to thy griefs, and echo sighs to mine)—

Hahnemann commenced another investigation into the nature and origin of diseases. He classes them under the heads of 'acute diseases,' which may be solitary or epidemic; medical diseases; and chronic diseases. It is with respect to the latter that he has made the most notable discoveries. Every one of them may be traced to a chronic miasm, the worst of which seems to be the itch ‡—this vulgar ailment being the real source of scrofula, rickets, and epilepsy. But the most laborious part of Hahnemann's undertakings was a series of experiments which he instituted for the purpose of ascertaining the uses and operation of medicines. Here he acted on this very just and proper principle, that, if anyone were to be poisoned in the course of these researches, it should be himself, his family, and his friends,* Franz, Hornburg, and Stapf, with their eyes open, and not his unsuspecting patients. These experiments, as we are told, were continued during a period of twenty years; and some notion may be formed of the extent to which Hahnemann and his friends must have laboured in the cause of their suffering fellow-creatures when we have stated the following facts.† The homœopathic pharmacopœia is through their means enriched with 200 articles, the properties of 150 of which have been elaborately investigated. The object was to determine what symptoms in the healthy person each of these medicines might produce, with a view to ascertain in what diseases it would afford the means of cure. It was found that aconite produces 500 symptoms; arnica upwards of 600; arsenic and sulphur each upwards of 1,000; pulsatilla, 1,100; and nux vomica as many as 1,300, and so on: the whole, as Dr. Curie ‡ observes, 'forming a vast arsenal, within which the homœopathic physician is at liberty to select the weapons to be used in his contest with disease.'

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* Organon, p. 73.

† Ibid. p. 79.

‡ Principles of Homœopathy, pp. 119–121.

It makes one shudder to reflect on the sufferings of Dr. Hahnemann, his family, and his friends Franz, Hornburg, and Stapf, during those twenty years of probation. They must have experienced the symptoms of every existing disease one hundred times over. The variety of the symptoms, moreover, must have been not less perplexing to their intellects than distressing to their feelings. The lycopodium§ cures, and therefore, according to the 'star of truth,' must cause, 'attacks of teasing pain in the top of the head, in the forehead, temples, eyes, and nose; head-ache in the exterior of the head during the night; piercing and scraping pain; suppuration of the eyes; disagreeable impressions produced by organ-music; warts in the nose; ulcerated nostrils; repugnance for brown bread; risings of fat; canine appetite; dry, snoring cough; nocturnal pain in the elbows; cramps; a turning back of the toes in walking; itching; old ulcers of the legs; painful pluckings of the limbs; thoughts preventing sleep; a capricious and irritable temper; morose, uneasy state of mind; a tendency to seek quarrels!' &c. &c. &c. Again, muriate of soda,* or common culinary salt, cures (and therefore produces) 'jolting in the head; incapability of thinking; splitting, teasing, and lancinating head-ache; plucking pains in the forehead; shutting of the eyes in the morning; whirlings in the stomach; noises in the left side of the belly; pain like that caused by a dislocation of the hip; inconvenience from eating bread; irritability, disposing to anger; sadness; great propensity to be frightened; leanness; a tendency to twist the loins,' &c. &c.

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* Curie, Principles, &c., p. 104.

† Curie, Practice of Homœopathy, p. 40.

‡ Ibid. p. 41.

§ Ibid. p. 293.

We shall not distress our readers by any further description of what these self-devoted individuals must have endured. But it is satisfactory to know that they did not suffer in vain—that they surmounted all the obstacles which lay before them—and that the world has now the opportunity of profiting by their fortitude and perseverance.

But in the course of these investigations Hahnemann made another discovery, at least equal in value to any of those which he had made before. Hitherto it had been supposed that the effects of any medicinal substance taken into the system bear some proportion to the quantity taken; that if two mercurial pills taken daily would make the gums sore, four would make them very sore; if ten grains of ipecacuanha would make you sick, twenty would make you very sick; if eight drops of solution of arsenic, taken three times daily, would put an end to an ague, twenty might put an end to the patient. There might be some exceptions to this rule, but it was believed that they were very rare. But Hahnemann discovered that all this is a mistake:—that in order to obtain the full and proper effect of a medicine, the dose of it must be diminished to the millionth, the billionth, and even to the decillionth of a grain. We cannot illustrate this matter better than by reference to the powerful effects which we have already described as produced by common culinary salt. But these effects arise only when it comes in a minute dose from the hands of a homœopathist. We all of us swallow it in greater or less quantity daily—and some of us in very large quantity—without experiencing any one of them.

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* Curie, Practice of Homœopathy, p. 302.

But here we meet with a very great difficulty as to the method by which this extreme degree of dilution of medicinal agents is to be determined; nor does the most diligent examination of the homœopathic writings enable us to get over it. Let us suppose a medicine to be in a liquid form, which is of course divisible with much less labour than that which is solid. In order that a single drop should represent the millionth part of a grain, the solution must be in the proportion of one grain to upwards of thirteen gallons of the solvent, which is either water or alcohol. But a billion is a million of millions; and the dose of a billionth of a grain would require one million times that quantity of the solvent, or about 217,000 hogsheads! Then, as to the smaller fractions, there may be some difference of opinion as to what they mean. Dr. Johnson's Dictionary, however, on the authority of Mr. Locke, defines a trillion to be a million of millions of millions—that is, a million of billions. As Mr. Locke invented the word, he had a right to give his own definition of it; and this being admitted, as a trillion is the third power of a million, so a decillion must be the tenth power of a million—a number represented by sixty places of figures, and defying all human conception!

The *cold-water system* possesses the advantage (perhaps we ought rather to say the disadvantage) of being more simple, and more within the reach of vulgar comprehension, than the mysteries of homœopathy. The inventor of it is one Vincent Priessnitz, concerning whom we are supplied with the following interesting particulars by Mr. Wilson.

He is 'a peasant of Silesia, built with broad shoulders, without any tendency to fat, five feet eight inches in height, with an excellent phrenological development, especially of those organs which relate to comparison, casualty [causality ?], firmness, combativeness, and destructiveness; having had his front teeth knocked out; appearing a larger man at a distance than he is found to be when you are close to him; having a suspicious look; of few words; and drinking nothing but milk at his breakfast and supper.'*

The individual thus happily gifted has discovered that all diseases are to be cured by wrapping up the patients in blankets and feather beds, so as to produce perspiration; and by the use of wet sheets, and cold baths of various kinds, and plentifully drinking cold water; and he has a large establishment at Graefenberg,† where five hundred patients are assembled for the purpose of undergoing his peculiar method of treatment. They dine daily on soup, bouilli, horse-radish sauce, veal, mutton, plum-sauce, potatoes, and pork, &c. &c.: eating as much as they can, and sometimes too much; and drinking prodigious quantities of cold water. They take exercise daily, by walking and sawing wood; and are not allowed to wear flannel. Whether it be better to sleep or walk after dinner is not yet determined; and we conclude that in this respect the patients do as they please. On Sunday evening, after supper, they dance, have music, and play cards.

The authors of the three last works prefixed to this article have undertaken to explain this system for the benefit of the English public. Mr. Claridge is a gentleman of some literary accomplishments, being especially a proficient in that style of composition which is distinguished by the name of 'rigmarole.' He is an admirer of Priessnitz merely as a philanthropist and amateur, not seeking to enter into competition with him as a practitioner; but Mr. Wilson, physician to his Serene Highness the Prince of Nassau, has, we believe, set up a water establishment of his own somewhere in this country; and, although a great admirer of Priessnitz, thinks that his system admits of improvement in many respects. He must, at any rate, know a good deal about it, having

* Wilson, p. 25.

† Claridge, p. 136.

resided at Graefenberg for eight months;* followed Priessnitz like a shadow; having taken in his own person 500 cold-baths, 2,400 sit-baths, reposed 480 hours in wet sheets, and drunk 3,500 tumblers (we suppose rather more than three hogsheads) of cold water. Dr. Feldmann also is a physician, *belonging to several medical universities*, having a great horror of quacks, especially of English apothecaries and French physicians, and himself a practitioner on the cold-water system. Dr. Feldmann's faith, however, is not so complete as that of Mr. Claridge, nor even of Mr. Wilson. He thinks that drugs are necessary also, and he administers them in a way peculiar to himself.† To rich old ladies and gentlemen who think themselves ill, but are not so in reality, he gives twelve papers of white sugar, directing that one shall be taken daily. When this begins to disagree with the patient, in order that *aliquid fecisse videatur*, he gives an agreeably scented water, with a delicate syrup, ordering a table-spoonful to be taken daily, exactly at eleven o'clock; and he has found this method of proceeding to give the greatest satisfaction to his patients. In other cases, we conclude (for Dr. Feldmann does not absolutely say so) that he has recourse to more active remedies; and he has ascertained that great evils have arisen at the Graefenberg establishment in consequence of Priessnitz trusting too exclusively to cold water. Hundreds of patients have left it without having derived the least benefit, after having passed several weeks in the vain expectation of a salutary crisis in the shape of an immense eruption of boils.‡ Hundreds of others have drunk themselves into a dropsy. But he adds:—'I am, notwithstanding, convinced that the cold-water system is inseparable from medical science. I am equally certain that it can be applied with safety and effect only several days after the body has been in a state of perspiration as prescribed. This is a *conditio sine quâ non*. My method of applying cold water is, however, altogether different from that practised at Graefenberg; for, in the first place, I am of opinion that the application of cold water, or the use of the cold-bath, should never be allowed during, or immediately after, a state of perspiration, but only a considerable time after; *secondly*, I object to the use of the entire cold-bath at the commencement of medical treatment; *thirdly*, I differ from Priessnitz in thinking that every patient should have a morbific crisis, that is, an eruption of boils,' &c. &c.

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* Wilson, p. 68.

† Feldmann, p. 67.

‡ Ibid. p. 109.

Who shall decide where doctors disagree? We certainly, in this instance at least, shall undertake no such responsibility. With respect to Mr. Priessnitz's plan of treatment, however, it is but fair that we should say thus much. Whatever may be the value of his cold-baths, and sit-baths, and wet sheets, and drenching with cold water, there is one part of it which seems calculated to be useful under certain circumstances. Individuals of strong constitutions, who have led indolent and luxurious lives, and are in consequence liable to gouty and rheumatic diseases, will probably derive benefit from exercise in walking and sawing wood, from being wrapped up in blankets and feather beds until they perspire, and, we may add, from the indifferent dinners at Graefenberg. We must also, in justice to Mr. Wilson, express our opinion that, although he may not cure consumption, or madness, or hydrophobia, by means of his cold water, yet that he will do a real service to no small proportion of his countrymen—if he can persuade them to take more exercise in the open air, to indulge themselves less in eating and drinking, and to look for the enjoyment of health not so much to the aid of medicine as to prudent and temperate habits of life.

But, whatever may be the good derived from exercise, perspiration, and abstinence, the Graefenberg system, or *hydropathy*, as Mr. Claridge* (perhaps facetiously) calls it, will owe its reputation not so much to these old-fashioned remedies, as to the novelty of wet sheets, drenching with cold water, sit-baths, &c.; and these will assuredly prevail, and cause it to flourish for a season, until some person of note, who has submitted to this mode of treatment, is crippled by a rheumatic fever, or dead from a carbuncle, or until some fresher novelty arises to push it from its stool, and furnish another instance of the transitory nature of earthly glory.

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* From *ὕδωρ* and *πάθος*. The literal meaning of hydropathy is, therefore 'diseases produced by water.'

That there will be other projects of the same description, and that there will be always some new delusion to succeed to an old one, can be a matter of no doubt in the mind of anyone who is at the pains to consider the circumstances to which such projects and such delusions are indebted for their origin. One of these we have already noticed. Whatever good may arise from the exercise of the healing art, it cannot do all that is wanted; and the instinct to preserve life and to avoid suffering will often induce individuals to look for other help when that of science fails. This will especially happen among the affluent classes of society, to whom life is more valuable than it is to the poor—who are more accustomed to have their desires gratified—and who are more attractive objects of attention to those that deal in promises of cure.

Another cause leading to the same result has been thus described by the clever lady to whose letters we have already had occasion to refer:—

'I attribute it to the fund of credulity which is in all mankind. We have no longer faith in miracles and relics, and therefore with the same fury run after receipts and physicians. The same money which three hundred years ago was given for the health of the soul is now given for the health of the body, and by the same sort of persons, women and half-witted men. In the countries where they have shrines and images quacks are despised, and monks and confessors find their account in managing the hopes and fears which rule the actions of the multitude.'

'Another original principle,' says Dr. Reid,* 'implanted in our nature by the Supreme Being, is a disposition to confide in the veracity of others, and to believe what they tell us. This is the counterpart of the former; and as that was termed the principle of veracity, so we shall, for want of a better name, call this the principle of credulity. It is unlimited in children until they meet with instances of deceit and falsehood, and it retains a considerable degree of strength through life.'

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* Inquiry into the Human Mind. Edinburgh, 1764, p. 477.

In fact, we are all credulous on subjects of which we have no actual knowledge. A person who knows nothing of navigation would believe a story that would be laughed at by a midshipman. Another, who is ignorant of the principles of political economy, may be persuaded that wealth would be increased by the multiplication of bank-notes. A young physician, or surgeon, on the point of commencing practice, having read in a medical journal a statement of a wonderful cure produced by some new medicine, may not doubt it to be true; while a more experienced practitioner will say, 'It may be so; but, according to my observations, in nine cases out of ten such stories prove to be without foundation.' How many grave persons were deceived by the impostures of Miss M'Avoy of Liverpool, of the Misses Okey of St. Pancras, and of the fasting-woman of Tetbury, although there was no one among them whose exploits could be compared to those of a conjuror at a country fair! It would seem that there is nothing so absurd that it may not be believed by somebody; and it is not the smaller intellects alone that are thus credulous. Dr. Johnson believed in the Cock Lane ghost. It has been gravely stated by Bishop Berkeley that M. Homberg made gold of mercury, by introducing light into its pores, 'but at such trouble and expense that no one would make the experiment for profit; for the truth of which I refer to the Memoirs of the French Academy.' One of the most clear-headed of our modern physiologists is of opinion that during what has been called the magnetic sleep the soul is disengaged from the body, and from the restraints of time and space. Having before us the example of such hallucinations as these, we cease to wonder that mankind should be liable to be imposed upon where their feelings are so much interested as in the preservation of life and health. But there are still other causes in operation.

The Abbé Fontana, in his treatise on poisons, speaking of the various specifics which have been recommended as preventing the ill consequences of the bite of a viper, shows that they owe their reputation simply to this circumstance, that the poison is not of sufficient power to destroy the life of a man; in other words, that the recovery is spontaneous. We have no doubt that many well-instructed medical practitioners have not sufficiently considered what course a given disease would take if it were left to itself; and as to others, it is not possible that they should have any real knowledge on the subject. With the majority of persons a recovery will generally pass for a cure. A patient who, having suffered from the usual ill consequences of too luxurious habits, in the shape of indigestion and low spirits, perseveres in dining early and moderately, and in taking a reasonable quantity of exercise, will probably attribute the improvement which follows to the homœopathic globule which he swallows three times daily, although he really is indebted for it to his altered mode of life. A large proportion of those who rush annually in search of health to the German baths would find their health improve just as much from the alteration of their habits which the going abroad imposes on them, even though their lips were never moistened by the waters of Wisbaden or Carlsbad. In cases of chronic disease the change from a cold to a warmer season, or from a life of too great exertion to one of comparative repose, will often be followed by a marked amelioration of the symptoms, independently of all medical treatment; and circumstances not unfrequently occur which lead the patient to believe, sometimes that he is better, at other times that he is worse, although he is neither better nor worse in reality. Then it is known to those who are well instructed in the medical sciences, that the symptoms of some of the most formidable nervous diseases (that which is commonly called the *tic douloureux*, for example) may disappear altogether for a time spontaneously, the remedy last used generally having the credit of the cure; and that the same thing happens to a still more remarkable extent in aggravated cases of hysteria, where it is not uncommon for symptoms which excite and terrify a whole family to vanish all at once without any evident reason, or perhaps under the influence of some powerful impression on the mind. Some of Dr. Feldmann's friends, 'the rich old ladies and gentlemen who think themselves ill and are not so,' whom he indulges with 'papers of white sugar and agreeably scented waters,' may recover in the same manner, and do justice to the doctor's skill.

The fact is, that in most cases of disease so many causes are in operation tending to influence the result, that few things are more difficult than to ascertain the real value of a new remedy. If a remedy be had recourse to for the first time, and the symptoms yield, that may be a reason for giving it another trial, but it is nothing more. If it be administered under circumstances as nearly as can be similar, and the symptoms yield in four or five cases in succession, there is reason to hope that the remedy and the cure may stand in the relation of cause and effect to each other. But even this will not satisfy a real master of his art, who will require a still more extended experience before he will adopt its use, feeling that he has a right to expect that such or such effects will follow.

The union of a broken bone, and the healing of a simple wound, are the results of a natural process. The recovery from many internal complaints is the result of a natural process also. Under such circumstances the best evidence of the skill of the physician or surgeon is, that he merely watches what is going on, taking care that nothing may obstruct the work of restoration, and avoiding all further interference. But it is his duty also to learn what unassisted Nature can do, and what she cannot do, and, where her powers are insufficient, to step in to her assistance, and act with promptness and decision. It is just at this point that danger arises from faith in pretended remedies. If they have the virtue of being in themselves innocent, no harm can result from their use where nothing is wanted or nothing can be done: but it is quite otherwise on those occasions which call for active and scientific treatment; and we have good reason to say that many individuals have lost their lives from trusting to their use under these circumstances.

It must further be observed that, in speaking of pretended remedies as innocent, we would by no means have it to be understood that that character belongs to all of them. There are indeed many which are neither innocent nor inefficient; and this will account at the same time for the reputation which they acquire and the mischief which they do. Many of what are called *quack medicines* are very useful, if properly administered, and not a few of them have been transferred with advantage to the Pharmacopœia of the College of Physicians. But the best remedies should not be used at random. It is a very good thing to be bled if you have an inflammation of the lungs; but it is a very bad thing to be bled when there is no adequate reason for it. If a medicine containing arsenic were to be administered as a specific for various disorders, some persons suffering from ague, and others having an eruption on the skin, might take it with advantage; but where there was one instance of its doing good there would be forty in which it did harm. St. John Long's liniment excited inflammation of the skin; and, where a blister would be useful, there is no doubt that this would be useful also. But all those who are ill, or who think themselves to be ill, do not require to be blistered, and in many cases it would do no good, and would probably be mischievous. Besides, the indiscreet application of it to a tender skin would be actually dangerous; and so it proved to be, the death of the patient having, as we have already stated, been occasioned by the use of it in at least two instances.

We could say much more on this subject if we had not before our eyes the fear of extending this article to an unreasonable length and wearying the patience of our readers. What has been already stated will of itself sufficiently explain how it is that the medical profession as a body are led to form a different estimate of the dealers in nostrums and proposers of short roads to cure from that which is formed by a large portion of the public. The former are behind the scenes, and know all the secrets of the pantomime. The latter only see the performances; and, where the tricks are cleverly managed, it is not very wonderful that they should sometimes mistake them for realities. But the medical profession are very generally supposed to be not very disinterested witnesses, and to have a prejudice beyond what they ought to have against discoveries which do not emanate from the regular craft. In like manner, the officers at Woolwich are accused of being prejudiced when they reject some absurd piece of artillery which is sent to them for experiment. Without entering into this question, we must acknowledge that it appears to us that with the majority of the medical profession there is an overweening desire to put down unlicensed practitioners. This seems to be the principal object of the various medical associations established with a view to obtain what is called 'medical reform.' The Provincial Medical Association has a committee on quackery, who make an annual report on the subject, and they would urge Parliament to interfere for the purpose of suppressing it with the strong hand of the law. But indeed we do not agree with them in the views which they have taken, and we shall, in conclusion, briefly state our reasons for this difference of opinion:—

First. We are convinced that the thing is impracticable. It may be made penal for a man to call himself a physician, or surgeon, or apothecary, who has not obtained a license; but how is he to be prevented from giving advice, and medicine too, under the name of botanist, hygeist, or homœopathist? Or he may put Doctor before his name on the door, and say, probably with truth, 'I am a Doctor, for I purchased the degree of Doctor of Philosophy for five pounds at Heidelberg.' Moreover, the experiment has been already made, and without success. The College of Physicians of London are armed by their charter and Acts of Parliament with ample powers for the purpose, but they long since abandoned the exercise of them in despair; and in France, where the legislature have done all that they could do to suppress it, quackery flourishes as much as in any country in the world.

But, *secondly*, even if the suppression of unlicensed practitioners were practicable, we are far from being satisfied that it would be either proper or expedient. If the art of healing had attained perfection, if physicians and surgeons could cure all those who apply to them, we grant that the case would be otherwise; but as matters now stand, would not such a proceeding be a very tyrannical interference with the right of private judgment? Let us see how such a system would operate in a particular instance. A patient labours under an incurable disease. His case is hopeless. His medical attendant complains in a court of justice, or some one complains for him, that the patient has placed himself under the care of an unlicensed practitioner, who has never studied medicine, who treats all who consult him with the same remedies, and believes that most of the diseases to which mankind are subject arise from cows eating buttercups; and therefore he requires that the interloper should be punished. But it turns out that the remedies which this individual administers are innocent; and as to the theory of buttercups, it is as good as Cullen's theory of fever, and it can do no harm. It is a comfort to the patient to try this new scheme, and wherefore should he be prevented from doing so?

It must not, however, be inferred that we would make no difference between properly educated and licensed practitioners and mere pretenders. That would be as great an error on one side, as the attempt altogether to suppress the latter would be on the other. A man may run the risk of ruining himself, if he be pleased to do so, by embarking his money in a Cornish mine; but he must not enter into such a speculation with the money which he holds in trust for others. In like manner, each individual has a right to manage his own health in his own way, and to consult whomsoever he prefers about his own complaints. But it is quite different when he has to provide for the health of others; and we conceive that the law ought to interfere to prevent any persons but those who are duly authorised to practise from holding appointments as physicians or surgeons of hospitals, schools, or ships, or as medical attendants of the poor; and the same rule should extend to the different branches of the public service. On the same principle, the certificates of none but licensed practitioners should be received in courts of justice, nor should any others be enabled to claim the usual exemption from serving on juries and in parish offices.

If we have been rightly informed, this is nearly the plan which Sir James Graham had intended to propose if he had introduced into parliament a bill, of which he gave notice in the last session, for regulating the medical profession. If that profession require any further protection, we take leave to say that it is in their own hands. Let them rely on their own skill, character, and conduct; let them discountenance among themselves all those who, though regularly educated and licensed, endeavour to delude or take advantage of the public, or to puff themselves into notice by unworthy means; let them claim for their art no more credit than it really deserves, nor make promises which they have not a just expectation of being able to fulfil; and we venture to assure them that they will have nothing to fear. They cannot make man immortal, but they can on so many occasions stand between life and death, and on so many others relieve the most grievous sufferings, that no one will refuse to admit that they are among the most useful, whilst they themselves must be conscious that they are among the most independent, members of society.

HOMŒOPATHY.

FROM FRASER'S MAGAZINE,

SEPTEMBER 1861.

You desire me to give you my opinion of what is called Homœopathy. I can do so without any great labour to myself, and without making any exorbitant demand on your patience, as the question really lies in very small compass, and what I have to say on it may be expressed in very few words.

The subject may be viewed under different aspects. We may inquire, first, whether Homœopathy be, of itself, of any value, or of no value at all? secondly, in what manner does it affect general society? and thirdly, in what relation does it stand to the medical profession?

I must first request of you to observe that, whatever I may think at present, I had originally no prejudice either in favour of or against this new system: nor do I believe that the members of the medical profession generally were in the first instance influenced by any feelings of this kind. The fact is, that the fault of the profession for the most part lies in the opposite direction. They are too much inclined to adopt any new theory or any new mode of treatment that may have been proposed; the younger and more inexperienced among them especially erring in this respect, and too frequently indulging themselves in the trial of novelties, disregarding old and established remedies. For myself, I assure you that, whatever opinion I may now hold, it has not been hastily formed. I have made myself sufficiently acquainted with several works which profess to disclose the mysteries of

Homœopathy, especially that of Hahnemann, the founder of the Homœopathic sect, and those of Dr. Curie and Mr. Sharpe. The result is, that, with all the pains that I have been able to take, I have been unable to form any very distinct notion of the system which they profess to teach. They all indeed begin with laying down, as the foundation of it, the rule that *similia similibus curantur*; or, in plain English, that one disease is to be driven out of the body by artificially creating another disease similar to it. But there the resemblance ends. Hahnemann treats the subject in one way, Dr. Curie in another, and Mr. Sharpe in another way still. General principles are asserted on the evidence of the most doubtful and scanty facts; and the reasoning on them for the most part is thoroughly puerile and illogical. I do not ask you to take all this for granted, but would rather refer you to the books themselves; being satisfied that anyone, though he may not be versed in the science of medicine, who possesses good sense, and who has any knowledge of the caution with which all scientific investigations should be conducted, will arrive at the same conclusions as myself.

But, subordinate to the rule to which I have just referred, there is another, which, by some of the Homœopathic writers, is held to be of great importance, and which is certainly the more remarkable one of the two. The doses of medicine administered by ordinary practitioners are represented to be very much too large. It is unsafe to have recourse to them, unless reduced to an almost infinitesimal point; not only to the millionth, but sometimes even to the billionth of a grain. Now observe what this means. Supposing one drop of liquid medicine to be equivalent to one grain, then, in order to obtain the millionth part of that dose, you must dissolve that drop in thirteen gallons of water, and administer only one drop of that solution; while, in order to obtain the billionth of a grain, you must dissolve the aforesaid drop in 217,014 hogsheads of water. Of course, it is plain that this could not practically be accomplished, except by successive dilutions; and this would be a troublesome process. Whether it be at all probable that anyone ever undertook to carry it out, I leave you to judge. At any rate, I conceive that there is no reasonable person who would not regard the exhibition of medicine in so diluted a form as being equivalent to no treatment at all.

But however this may be, I may be met by the assertion that there is undoubted evidence that a great number of persons recover from their complaints under Homœopathic treatment, and I do not pretend in the least degree to deny it. In a discourse addressed by myself to the students of St. George's Hospital, in the year 1838, I find the following remarks:—'There is another inquiry which should be always made, before you determine on the adoption of a particular method of treatment; what will happen in this case, if no remedies whatever be employed, if the patient be left altogether to nature or to the efforts of his own constitution? . . . . The animal system is not like a clock or a steam-engine, which, being broken, you must send to the clockmaker or engineer to mend it; and which cannot be repaired otherwise. The living machine, unlike the works of human invention, has the power of repairing itself; it contains within itself its own engineer, who, for the most part, requires no more than some very slight assistance at our hands.' This truth admits, indeed, of a very large application. If the arts of medicine and surgery had never been invented, by far the greater number of those who suffer from bodily illness would have recovered nevertheless. An experienced and judicious medical practitioner knows this very well; and considers it to be his duty, in the great majority of cases, not so much to interfere by any active treatment, as to take care that nothing should obstruct the natural process of recovery; and to watch lest, in the progress of the case, any new circumstance should arise which would make his active interference necessary. If anyone were to engage in practice, giving his patients nothing but a little distilled water, and enjoining a careful diet, and a prudent mode of life otherwise, a certain number of his patients would perish from the want of further help; but more would recover; and Homœopathic globules are, I doubt not, quite as good as distilled water.

But this does not account for all the success of Homœopathy. In this country there is a large proportion of individuals who have plenty of money, combined with a great lack of employment; and it is astonishing to what an extent such persons contrive to imagine diseases for themselves. There is no animal machine so perfect that there may not at times be some creaking in it. Want of exercise, irregularity as to diet, a little worry of mind—these, and a thousand other causes, may occasion uneasy feelings, to which constant attention and thinking of them will give a reality which they would not have had otherwise; and such feelings will disappear as well under the use of globules as they would under any other mode of treatment, or under no treatment at all.

What I have now mentioned will go far towards explaining the success of Homœopathy. But other circumstances occur every now and then, from which, when they do occur, it profits to a still greater extent. *Humanum est errare.* From the operation of this universal law medical practitioners are not exempt any more than statesmen, divines, lawyers, engineers, or any other profession. There are cases in which there is a greater chance of too much than too little being done for the patient; and if a patient under such circumstances becomes the subject of Homœopathic treatment, this being no treatment at all, he actually derives benefit from the change.

In a discourse to which I have already alluded, I thought it my duty to offer the following caution to my pupils:—'The first question which should present itself to you in the management of a particular case is this: Is the disease one of which the patient may recover or is it not? There are indeed too many cases in which the patient's condition is so manifestly hopeless, that the fact cannot be overlooked. Let me, however, caution you that you do not in any instance arrive too hastily at this conclusion. Our knowledge is not so absolute and certain as to prevent even well-informed persons being occasionally mistaken on this point. This is true especially with respect to the affections of internal organs.

Individuals have been restored to health who were supposed to be dying of disease in the lungs or mesenteric glands.' . . . . 'It is a good rule in the practice of our art, as in the common affairs of life, for us to look on the favourable side of the question, as far as we can consistently with reason do so.' I might have added that hysterical affections are especially a source of error to not very experienced practitioners, by simulating more serious disease; seeming to resist for a time all the efforts of art, and then all at once subsiding under any kind of treatment, or, just as well, under none at all. Now, if it should so happen that a medical practitioner, from want of knowledge, or from a natural defect of judgment, makes a mistake in his diagnosis, and the patient whom he had unsuccessfully treated afterwards recovers under the care of another practitioner, it is simply said 'Dr. A. was mistaken;' and it is not considered as anything very remarkable that the symptoms should subside under the care of Dr. B. But if, on the other hand, the recovery takes place under the care of a Homœopathist, or any other empiric, the circumstance excites a much larger portion of attention; and we really cannot very well wonder that, with such knowledge as they possess of these matters, the empiric should gain much credit with the public.

So far the practical result would seem to be that Homœopathy can be productive of no great harm; and indeed, considering it to be no treatment at all, whenever it is a substitute for bad treatment, it must be the better of the two. But there is great harm nevertheless. There are numerous cases in which spontaneous recovery is out of the question; in which sometimes the life or death of the patient, and at other times the comfort or discomfort of his existence for a long time to come, depends on the prompt application of active and judicious treatment. In such cases Homœopathy is neither more nor less than a mischievous absurdity; and I do not hesitate to say that a very large number of persons have fallen victims to the faith which they reposed in it, and to the consequent delay in having recourse to the use of proper remedies. It is true that it very rarely happens, when any symptoms show themselves which give real alarm to the patient or his friends, that they do not dismiss the Homœopathist and send for a regular practitioner; but it may well be that by this time the mischief is done, the case being advanced beyond the reach of art.

That the habit of resorting to Homœopathic treatment which has prevailed in some parts of society should have occasioned much dissatisfaction among the mass of medical practitioners, is no matter of wonder. It cannot be otherwise than provoking, to those who have passed three or four years of the best part of their lives in endeavouring to make themselves well acquainted with disease in the wards of a hospital, to find that there are some among their patients who resort to them for advice only when their complaints have assumed a more painful or dangerous character; while they are set aside in ordinary cases, which involve a smaller amount of anxiety and responsibility, in favour of some Homœopathic doctor, who, very probably, never studied disease at all. But it cannot be helped. In all times there have been pretenders, who have persuaded a certain part of the public that they have some peculiar knowledge of a royal road to cure, which those of the regular craft have not. It is Homœopathy now; it was something else formerly; and if Homœopathy were to be extinguished, there would be something else in its place. The medical profession must be contented to let the thing take its course; and they will best consult their own dignity, and the good of the public, by saying as little as possible about it. The discussions as to the evils of Homœopathy which have sometimes taken place at public meetings, have quite an opposite effect to that which they were intended to produce. They have led some to believe that Homœopathists are rather a persecuted race, and have given to the system which they pursue an importance which it would never have had otherwise; just as any absurd or fanatical sect in religion would gain proselytes if it could only make others believe that it was an object of jealousy and persecution. After all, the harm done to the regular profession is not so great as many suppose it to be; a very large proportion of the complaints about which Homœopathists are consulted being really no complaints at all, for which a respectable practitioner would scarcely think it right to prescribe.

There was a time when many of the medical profession held the opinion that not only Homœopathy, but all other kinds of quackery, ought to be put down by the strong hand of the law. I imagine that there are very few who hold that opinion now. The fact is, that the thing is impossible; and even if it were possible —as it is plain that the profession cannot do all that is wanted of them, by curing all kinds of disease, and making men immortal— such an interference with the liberty of individuals to consult whom they please would be absurd and wrong. As it now is, the law forbids the employment in any public institution of anyone who is not registered as being a qualified medical practitioner, after a due examination by some of the constituted authorities; and it can go no further. The only effectual opposition which the medical professsion can offer to Homœopathy, is by individually taking all possible pains to avoid, on their own part, those errors of diagnosis by means of which, more than anything else, the professors of Homœopathy thrive and flourish; by continuing in all ways to act honourably by the public; at the same time, never being induced, either by good nature or by any motives of self-interest, to appear to give their sanction to a system which they know to have no foundation in reality. To join with Homœopathists in attendance on cases of either medical or surgical disease, would be neither wise nor honest. The object of a medical consultation is the good of the patient; and we cannot suppose that any such result can arise from the interchange of opinions, where the views entertained, or professed to be entertained, by one of the parties as to the nature and treatment of disease, are wholly unintelligible to the other.

THE
USE AND ABUSE OF TOBACCO.

FROM 'THE TIMES,'

AUGUST 31, 1860.

HAVING been applied to some time since to join in a petition to the House of Commons that they would appoint a committee to inquire into the effects produced by the prevailing habit of tobacco smoking, I declined to do so; first, because it did not appear to me that such a committee would be very competent to discuss a question of this kind; and, secondly, because, even if they were so, I did not see that it would be possible for Parliament to follow up by any act of legislation the conclusions at which they might have arrived. Nevertheless I am ready to admit that the subject is one of no trifling importance, and well worthy the serious consideration of anyone who takes an interest in the present and future well-being of society. From these considerations it is that I now venture to address to you the following observations.

The empyreumatic oil of tobacco is produced by distillation of that herb at a temperature above that of boiling water. One or two drops of this oil (according to the size of the animal) placed on the tongue will kill a cat in the course of a few minutes. A certain quantity of the oil must be always circulating in the blood of an habitual smoker, and we cannot suppose that the effects of it on the system can be merely negative. Still, I am not prepared to subscribe to the opinion of those who hold that, under all circumstances, and to however moderate an extent it be practised, the smoking of tobacco is prejudicial. The first effect of it is to soothe and tranquillise the nervous system. It allays the pains of hunger, and relieves the uneasy feelings produced by mental and bodily exhaustion. To the soldier who has passed the night in the trenches before a beleaguered town, with only a distant prospect of breakfast when the morning has arrived; to the sailor, contending with the elements in a storm; to the labourer after a hard day's work; to the traveller in an uncultivated region, with an insufficient supply of food, the use of a cigar or a tobacco pipe may be not only a grateful indulgence, but really beneficial. But the occasional use of it under such circumstances is a very different matter from the habit of constant smoking which prevails in certain classes of society at the present day.

The effects of this habit are, indeed, various, the difference depending on difference of constitution, and difference in the mode of life otherwise. But, from the best observations which I have been able to make on the subject, I am led to believe that there are very few who do not suffer harm from it, to a greater or less extent. The earliest symptoms are manifested in the derangement of the nervous system. A large proportion of habitual smokers are rendered lazy and listless, indisposed to bodily and incapable of much mental exertion. Others suffer from depression of the spirits, amounting to hypochondriasis, which smoking relieves for a time, though it aggravates the evil afterwards. Occasionally there is a general nervous excitability, which, though very much less in degree, partakes of the nature of the *delirium tremens* of drunkards. I have known many individuals to suffer from severe nervous pains, sometimes in one, sometimes in another part of the body. Almost the worst case of neuralgia that ever came under my observation was that of a gentleman who consulted the late Dr. Bright and myself. The pains were universal, and never absent; but during the night they were especially intense, so as almost wholly to prevent sleep. Neither the patient himself nor his medical attendant had any doubts that the disease was to be attributed to his former habit of smoking, on the discontinuance of which he slowly and gradually recovered. An eminent surgeon, who has a great experience in ophthalmic diseases, believes that, in some instances, he has been able to trace blindness from amaurosis to excess in tobacco smoking; the connection of the two being pretty well established in one case by the fact that, on the practice being left off, the sight of the patient was gradually restored. It would be easy for me to refer to other symptoms indicating deficient power of the nervous system to which smokers are liable; but it is unnecessary for me to do so; and, indeed, there are some which I would rather leave them to imagine for themselves than undertake the description of them myself in writing.

But the ill effects of tobacco are not confined to the nervous system. In many instances there is a loss of the healthy appetite for food, the imperfect state of the digestion being soon rendered manifest by the loss of flesh and the sallow countenance. It is difficult to say what other diseases may not follow the imperfect assimilation of food continued during a long period of time. So many causes are in operation in the human body which may tend in a greater or less degree to the production of organic changes in it, that it is only in some instances we can venture to pronounce as to the precise manner in which a disease that proves mortal has originated. From cases, however, which have fallen under my own observation, and from a consideration of all the circumstances, I cannot entertain a doubt that, if we could obtain accurate statistics on the subject, we should find that the value of life in inveterate smokers is considerably below the average. Nor is this opinion in any degree contradicted by the fact that there are individuals who, in spite of the inhalation of tobacco smoke, live to be old, and without any material derangement of the health; analogous exceptions to the general rule being met with in the case of those who have indulged too freely in the use of spirituous and fermented liquors.

In the early part of the present century tobacco smoking was almost wholly confined to what are commonly called the lower grades of society. It was only every now and then that anyone who wished to be considered as a gentleman was addicted to it. But since the war on the Spanish Peninsula, and the consequent substitution of the cigar for the tobacco pipe, the case has been entirely altered. The greatest smokers at the present time are to be found, not among those who live by their bodily labour, but among those who are more advantageously situated, who have better opportunities of education, and of whom we have a right to expect that they should constitute the most intelligent and thoughtful members of the community. Nor is the practice confined to grown-up men. Boys, even at the best schools, get the habit of smoking, because they think it manly and fashionable to do so; not unfrequently because they have the example set them by their tutors, and partly because there is no friendly voice to warn them as to the special ill consequences to which it may give rise where the process of growth is not yet completed, and the organs are not yet fully developed.

The foregoing observations relate to the habit of smoking as it exists among us at the present time. But a still graver question remains to be considered. What will be the result if this habit be continued by future generations? It is but too true that the sins of the fathers are visited upon their children and their children's children. We may here take warning from the fate of the Red Indians of America. An intelligent American physician gives the following explanation of the gradual extinction of this remarkable people:—One generation of them became addicted to the use of the fire-water. They have a degenerate and comparatively imbecile progeny, who indulge in the same vicious habit with their parents. *Their* progeny is still more degenerate, and after a very few generations the race ceases altogether. We may also take warning from the history of another nation, who some few centuries ago, while following the banners of Solyman the Magnificent, were the terror of Christendom, but who since then, having become more addicted to tobacco smoking than any of the European nations, are now the lazy and lethargic Turks, held in contempt by all civilised communities.

In thus placing together the consequences of intemperance in the use of alcohol and that in the use of tobacco, I should be sorry to be misunderstood as regarding these two kinds of intemperance to be in an equal degree pernicious and degrading.

The inveterate tobacco smoker may be stupid and lazy, and the habit to which he is addicted may gradually tend to shorten his life and deteriorate his offspring, but the dram-drinker is quarrelsome, mischievous, and often criminal. It is under the influence of gin that the burglar and the murderer become fitted for the task which they have undertaken. The best thing that can be said for dram-drinking is, that it induces disease, which carries the poor wretch prematurely to the grave, and rids the world of the nuisance. But, unfortunately, in this, as in many other cases, what is wanting in quality is made up in quantity. There are checks on one of these evil habits which there are not on the other. The dram-drinker, or, to use a more general term, the drunkard, is held to be a noxious animal. He is an outcast from all decent society, while there is no such exclusion for the most assiduous smoker.

The comparison of the effects of tobacco with those of alcohol leads to the consideration of a much wider question than that with which I set out. In all ages of which we have any record mankind have been in the habit of resorting to the use of certain vegetable productions, not as contributing to nourishment, but on account of their having some peculiar influence as stimulants or sedatives (or in some other way) on the nervous system. Tobacco, alcohol, the Indian hemp, the kava of the South Sea Islanders, the Paraguay tea, coffee, and even tea, belong to this category. A disposition so universal may almost be regarded as an instinct, and there is sufficient reason to believe that, within certain limits, the indulgence of the instinct is useful. But we must not abuse our instincts. This is one of the most important rules which man, as a responsible being, both for his own sake and for that of others, is bound to observe. Even such moderate agents as tea and coffee, taken in excess, are prejudicial. How much more so are tobacco and alcohol, tending, as they do, not only to the degradation of the individual, but to that of future generations of our species!

If tobacco-smokers would limit themselves to the occasional indulgence of their appetite, they would do little harm either to themselves or others; but there is always danger that a sensual habit once begun may be carried to excess, and that danger is never so great as in the case of those who are not compelled by the necessities of their situation to be actively employed. For such persons the prudent course is to abstain from smoking altogether.

THE FOLLOWING LETTER FROM SIR BENJAMIN BRODIE ACCOMPANIED HIS SIGNATURE TO A PROTEST SIGNED BY 500 MEMBERS OF THE MEDICAL PROFESSION, AGAINST THE ESTABLISHMENT OF SPECIAL HOSPITALS.

Broome Park, Betchworth, Surrey:
July 16, 1860.

Agreeing in the views expressed in the paper which you have sent me, I am happy to add my signature to it.

An exception, indeed, may be made, on grounds which meet with the general concurrence of the profession and the public, in regard to Ophthalmic Infirmaries. Otherwise it seems to me there are very great objections to the establishment of special hospitals for the treatment of particular diseases.

First.—Diseases generally are so connected with each other, and a knowledge of one is so necessary to the right understanding of another, that no one who limits his attention to any given disease, can be so competent to investigate its nature, and to improve the method of treating it, as those are who have a wider field of observation, and who are better acquainted with general pathology.

Secondly.—The effect of establishing special hospitals and infirmaries is to abstract particular classes of diseases from the general hospitals, and thus to prevent the students of those hospitals from having the opportunity of studying certain branches of their profession, an acquaintance with which is necessary to make them useful practitioners afterwards.

Thirdly.—The system of establishing special hospitals, which now prevails, is a source of much unnecessary expense to the public; each one of these, however humble it may be, requiring a separate house, and a separate establishment of matrons, nurses, and servants. At least two-thirds of the expense thus incurred would be saved, if the patients who are there admitted were sent to the existing general hospitals instead; and it cannot be said that in these last there is no room for their reception, there being several which are languishing for want of funds, with their wards empty because the means of supporting them have been drawn away to other institutions.

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